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1	794587	security lock	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
2	40468	((53/\$).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
3	15131	((383/\$).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
4	18778	((464/\$).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
5	73671	((53/\$).CCLS.) or ((383/\$).CCLS.) or ((464/\$).CCLS.)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
6	3827	(security lock) and (((53/\$).CCLS.) or ((383/\$).CCLS.) or ((464/\$).CCLS.))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:27
7	8	atm and ((security lock) and (((53/\$).CCLS.) or ((383/\$).CCLS.) or ((464/\$).CCLS.)))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:29
8	1	"automated teller machine" and ((security lock) and (((53/\$).CCLS.) or ((383/\$).CCLS.) or ((464/\$).CCLS.)))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:31
9	579	((53/570).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:31
10	0	("9 and ("air flow" or "gas flow"))).PN.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:31
11	0	("9 and air").PN.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:31
12	46	((53/570).CCLS.) and ("air flow" or "gas flow")	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:43
13	4	((464/\$).CCLS.) and (validate or validator or validator or validating)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:45
14	6438	((463/\$).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:45
15	579	((463/\$).CCLS.) and (validate or validator or validator or validating)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:46
16	422	((463/\$).CCLS.) and (validate or validator or validator or validating)) and (bills or dollars)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:45
17	438	((463/\$).CCLS.) and (validate or validator or validator or validating)) and (bills or dollars or currency)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:53

18	217	((463/\$).CCLS.) and ((validate or validator or validator or validating) with (bills or dollars or currency))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:46
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21	30	((463/\$).CCLS.) and (validate or validator or validator or validating)) and (bills or dollars or currency)) and (bag or container)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:51
22	2	((463/\$).CCLS.) and (validate or validator or validator or validating)) and ((bills or dollars or currency) with (bag or container))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/05/18 20:53



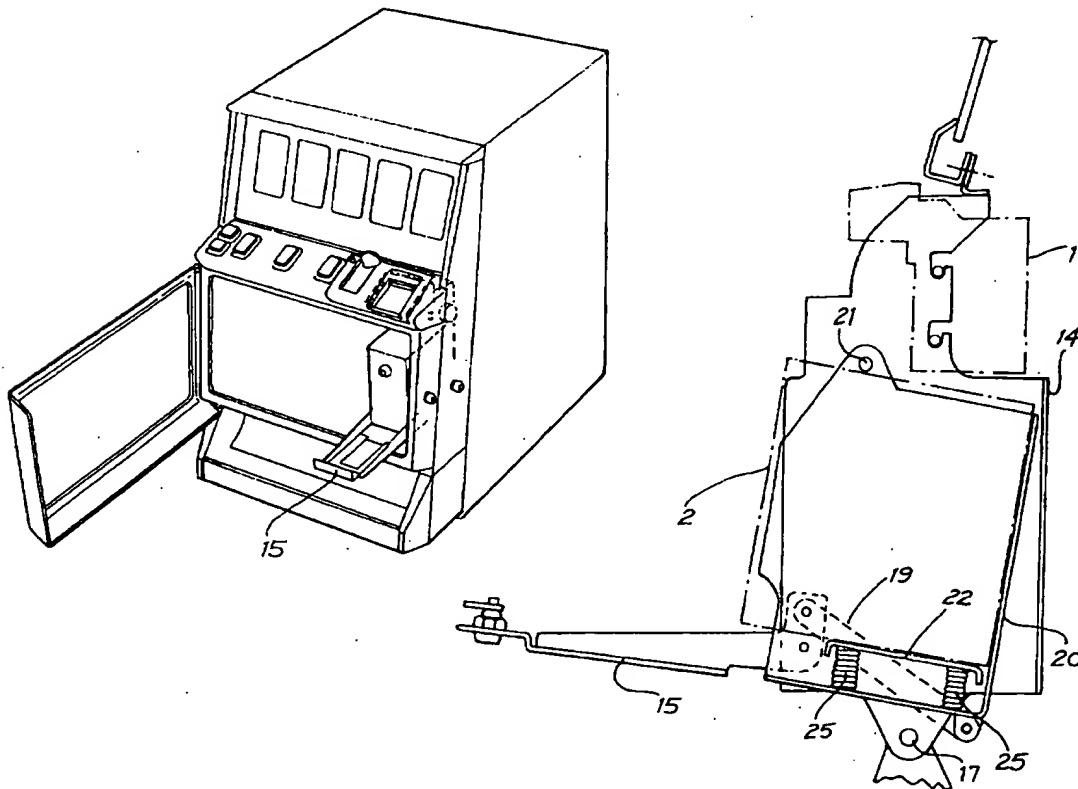
US005700195A

United States Patent [19]**Halic**[11] **Patent Number:** **5,700,195**[45] **Date of Patent:** **Dec. 23, 1997**[54] **SLOT MACHINES HAVING SECURITY FOR
BILL VALIDATOR AND BILL STACKER**5,515,959 5/1996 Stephenson, III et al. 194/206
5,544,728 8/1996 Dahrowski 194/206[75] **Inventor:** Vladimir Halic, Wollongong, Australia[73] **Assignee:** Aristocrat Leisure Industries, Sydney,
Australia*Primary Examiner*—Benjamin H. Layno*Attorney, Agent, or Firm*—Anderson Kill & Olick, P.C.[21] **Appl. No.:** 626,816[22] **Filed:** Apr. 3, 1996[51] **Int. CL⁶** G07F 17/34; G07F 7/04[52] **U.S. Cl.** 463/29; 463/20; 273/143 R;
194/350; 194/206[58] **Field of Search** 273/143 R, 138.1,
273/138.2; 463/20, 29, 25; 194/206, 350[56] **References Cited****U.S. PATENT DOCUMENTS**

4,326,620 4/1982 Felix et al. 194/1 A

[57] **ABSTRACT**

A slot machine comprising a cabinet, a first lockable door giving access to the interior of the cabinet, a second lockable door hingedly mounted in the first, a bill validator associated with a bill stacker arranged within the cabinet and supported in a housing, the housing have a lockable means controlling removal of the bill stacker from the housing, the said lockable means being accessible only through said second lockable door, the bill validator being accessible only through first lockable door for servicing or replacement.

3 Claims, 7 Drawing Sheets

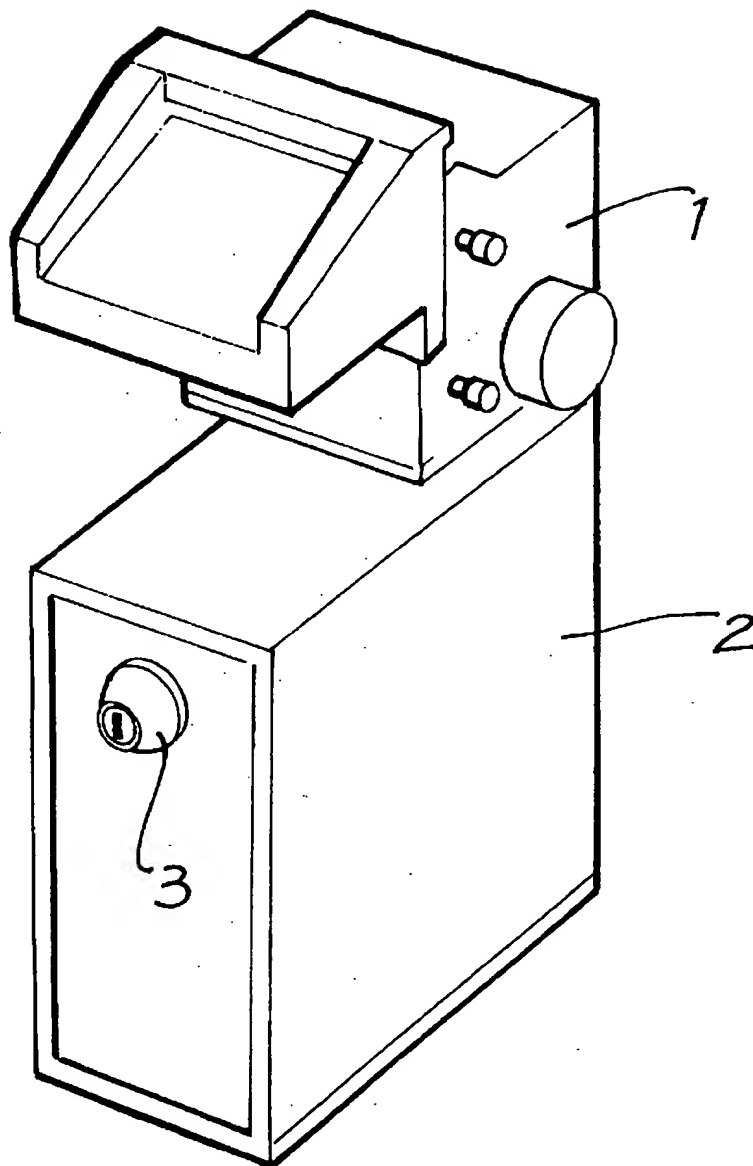
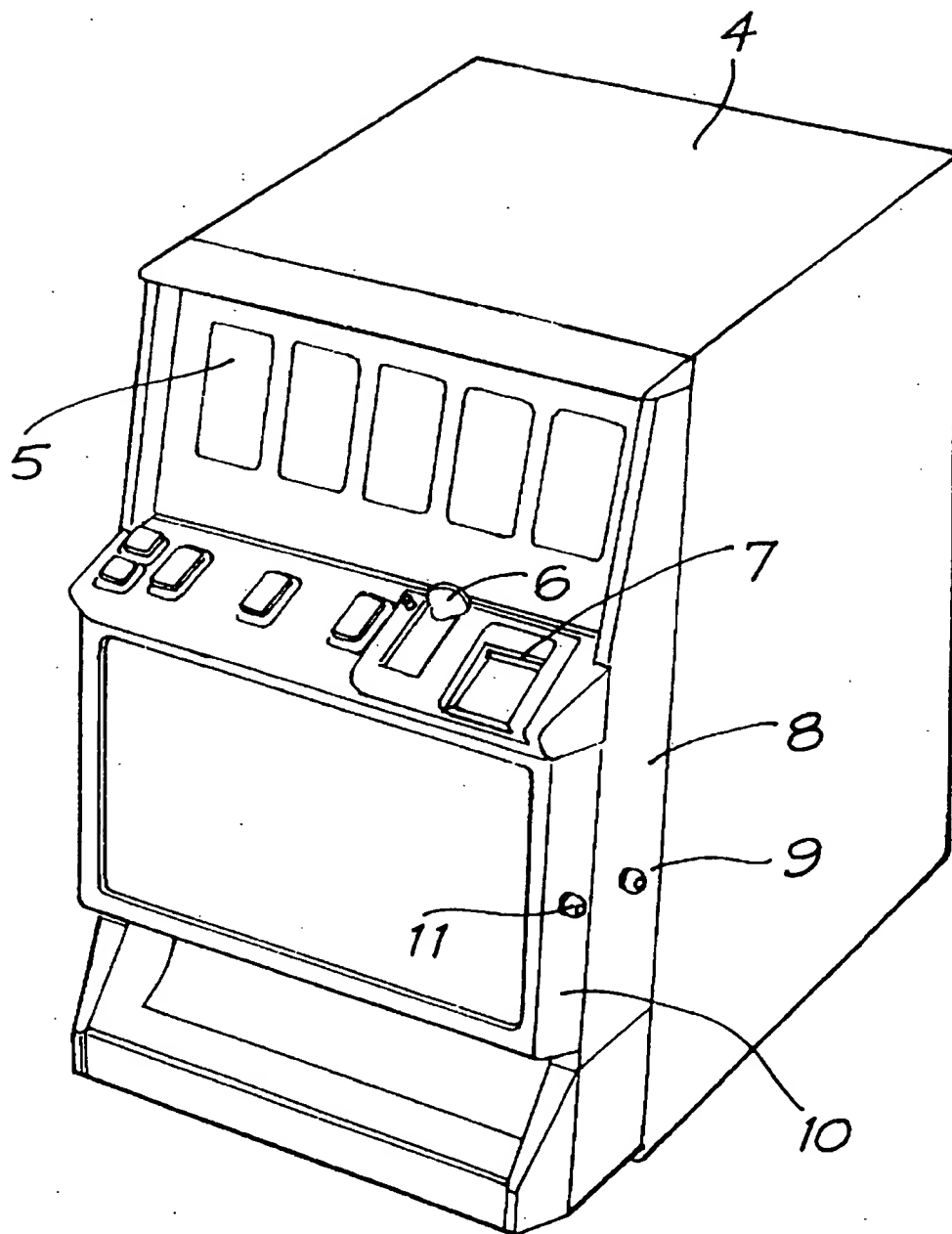


FIG. 1

**FIG. 2**

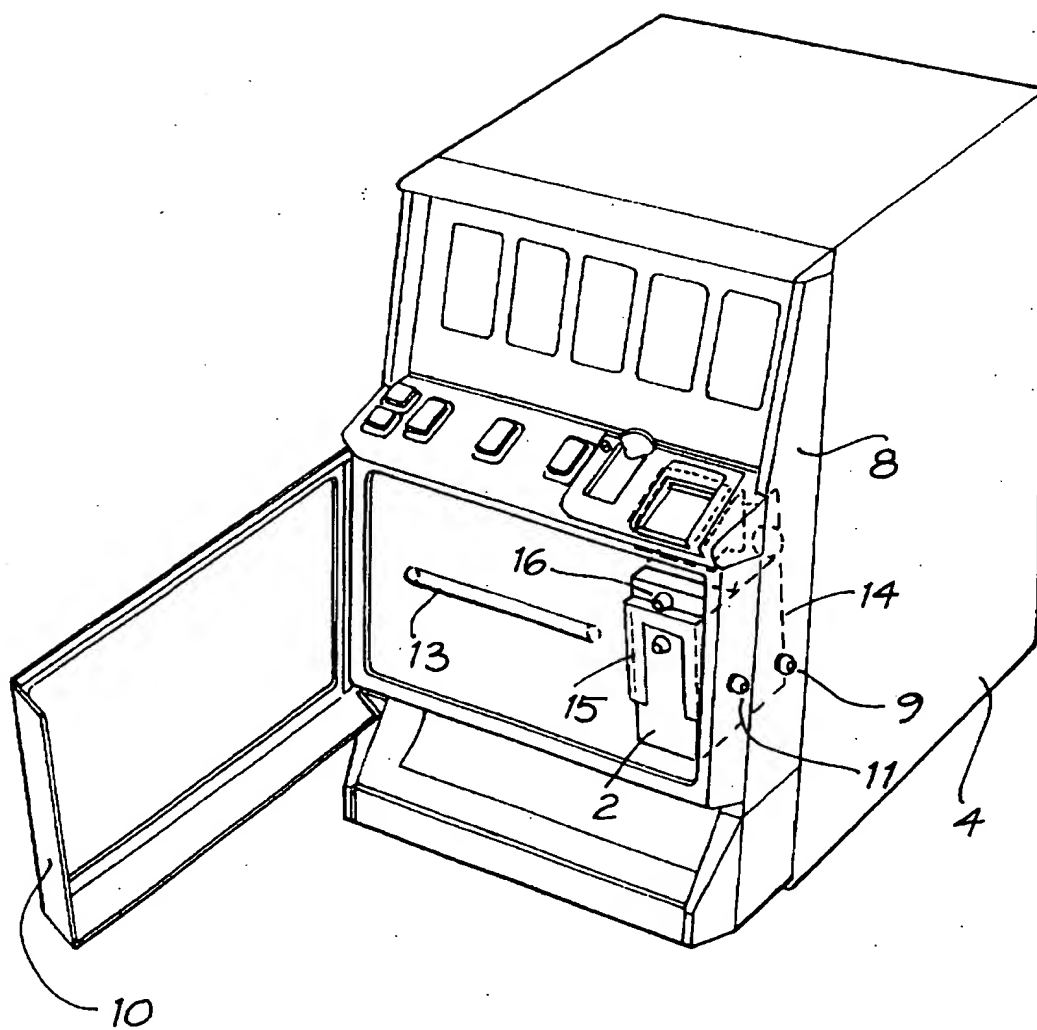


FIG. 3

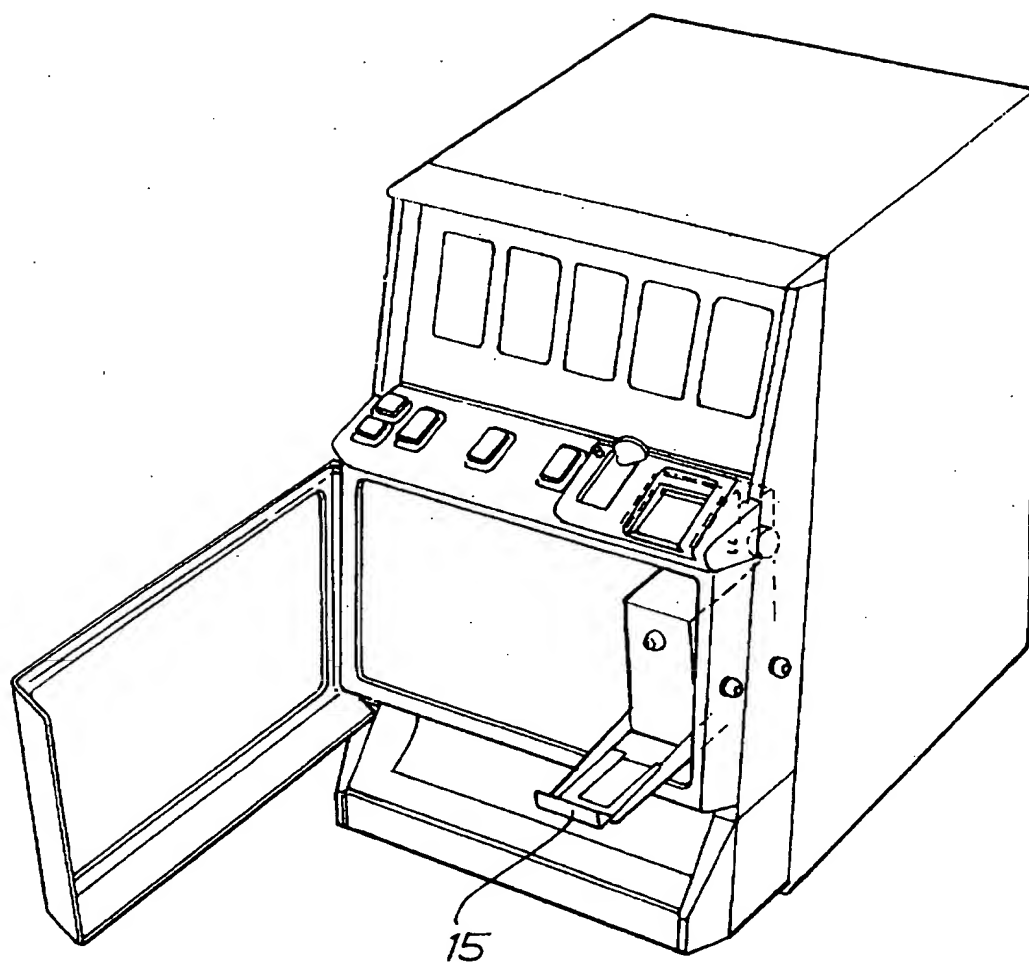
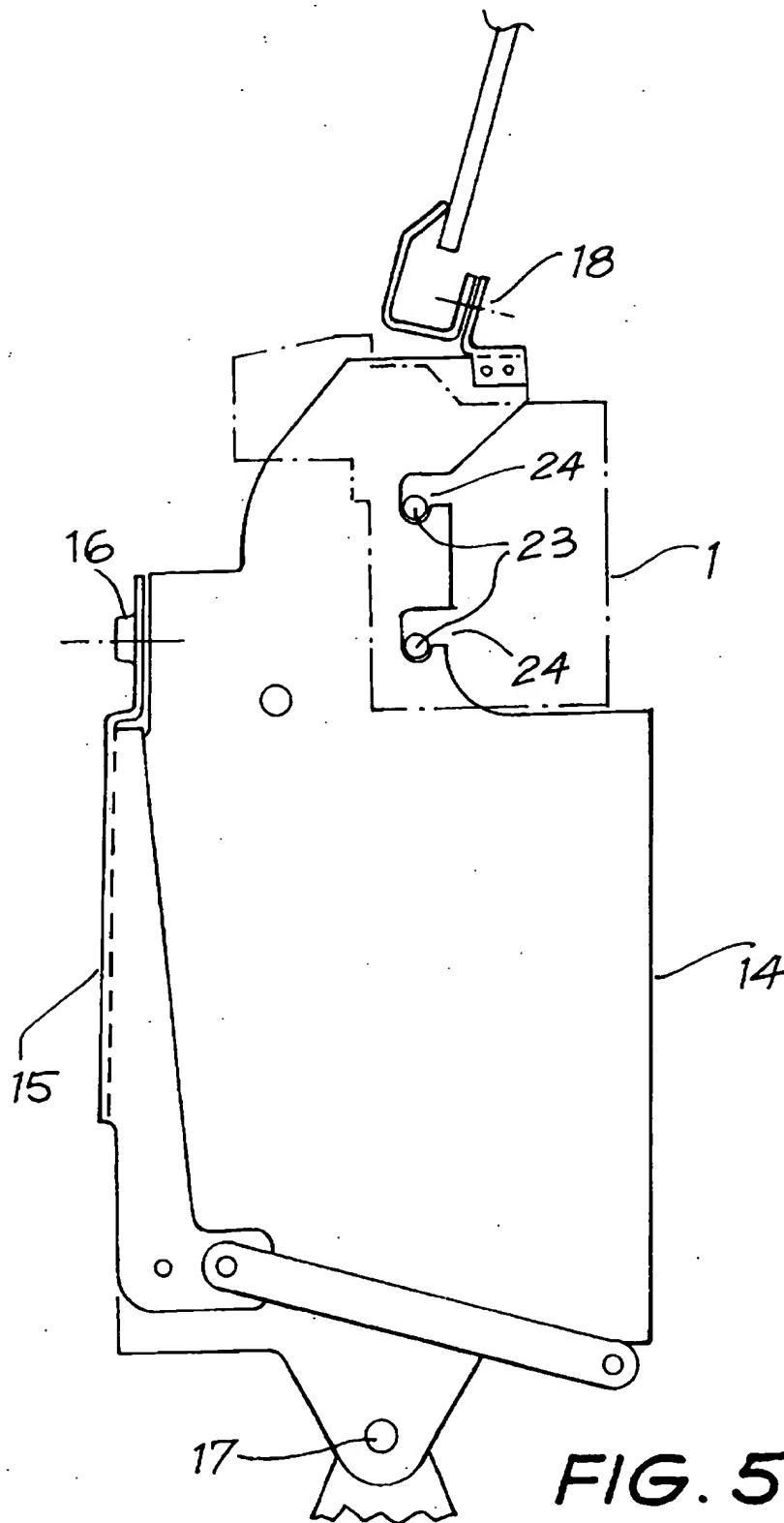
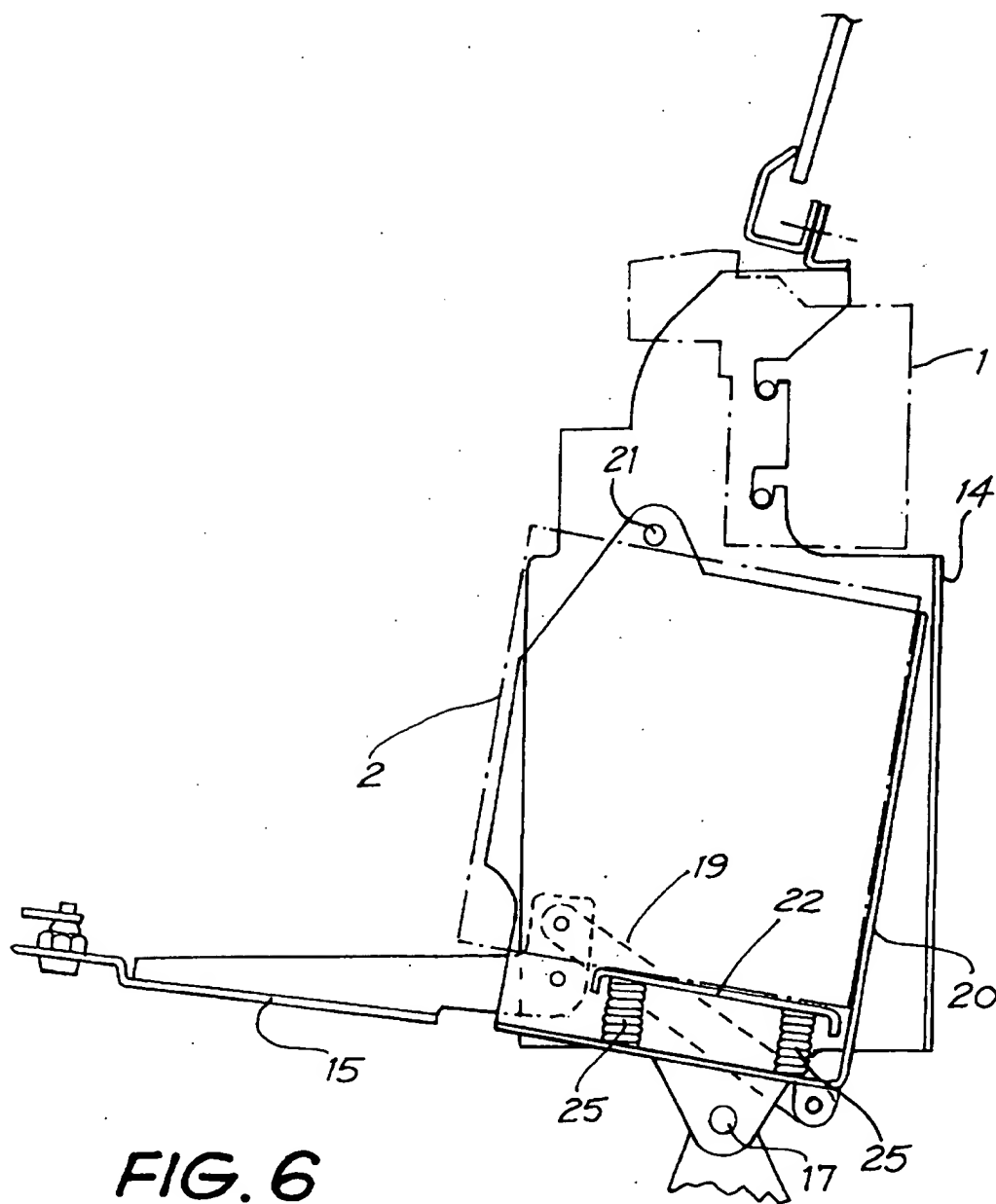


FIG. 4



**FIG. 6**

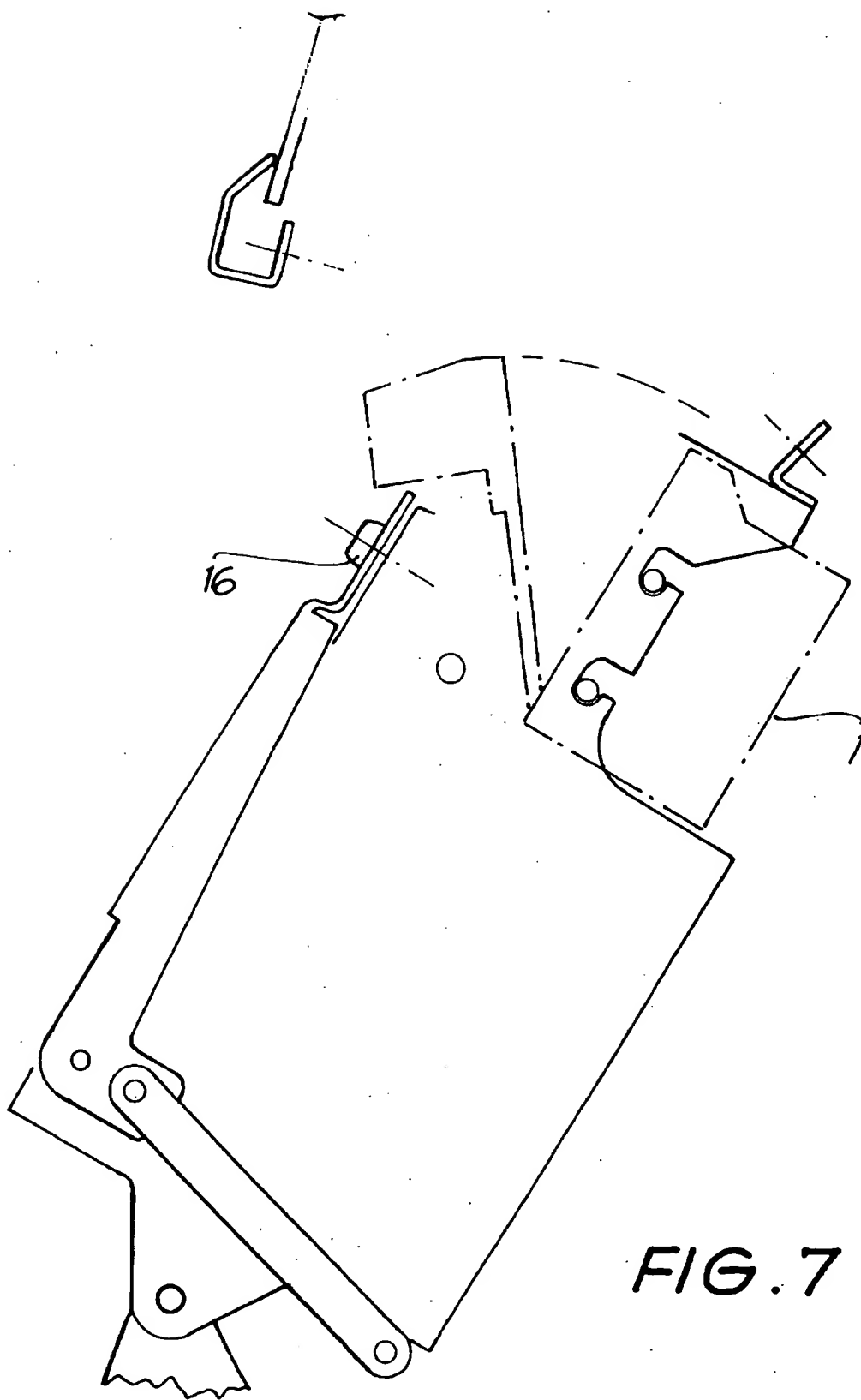


FIG. 7

SLOT MACHINES HAVING SECURITY FOR BILL VALIDATOR AND BILL STACKER

The present invention relates to slot machines and more particularly to a slot machine including means for accommodating a currency note validator and stacker.

In some parts of the world it is becoming more common to see a currency note validator, commonly known as a "bill changer" attached to the side of a slot machine (otherwise known as a poker or fruit machine). These bill changers are sophisticated devices made by specialist companies, and allow the player to obtain game credits by bills as well as playing by coin through the conventional coin slot of the machine.

DESCRIPTION OF THE PRIOR ART

With advanced technology the bill validator has been reduced in size to the point where it can be fitted within the slot machine itself, however the problems of security—whilst enabling ready access to remove accumulated bills and for easy servicing, have to be addressed in its new locations.

It is desirable, almost essential, that the accumulated bills can be removed from the machine without giving access to the interior, so that access to coins or the chances of cheating or collusion are greatly reduced. Coins are readily handled in this way as the machine is not opened to clear it. Also each time the machine's door is opened by a serviceman, this fact is automatically recorded.

It is also necessary to provide access to a validator by a serviceman for repair or replacement of the validator but without giving the serviceman access to the bill stacker in which bills inserted in the machine are stored.

SUMMARY OF THE INVENTION

The present invention provides a slot machine in which a bill validator and bill stacker are installed which meets the requirements set out above.

The present invention consists in a slot machine comprising a cabinet, a first lockable door giving access to the interior of the cabinet, a second lockable door hingedly mounted in the first, a bill validator associated with a bill stacker arranged within the cabinet and supported in a housing, the housing having a lockable means controlling removal of the bill stacker from the housing, the said lockable means being accessible only through said second lockable door, the bill validator being accessible only through first lockable door for servicing or replacement.

It is preferred that the bill stacker is carried in an inner liner of the housing that is pivotable in relation thereto, the bill stacker being maintained in a close functional relationship with the bill validator by spring means, the said lockable means being a drop down lockable door on the housing giving access to the bill stacker, the said dropped down door being connected to by link means to the inner liner whereby, on opening of the drop down door, the inner liner is caused to pivot in relation to the housing to move the bill stacker away from close contact with the validator and permit its removal.

It is further preferred that the housing is pivotably mounted to facilitate servicing or replacement of the validator.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the nature of the invention may be better understood a preferred embodiment is hereinafter described

by way of example with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a bill validator associated with a bill stacker;

FIG. 2 is a perspective view of a slot machine incorporating the invention;

FIG. 3 is a perspective view of a slot machine of FIG. 2 where the second lockable door is open;

FIG. 4 is a view similar to FIG. 3 with the drop down lockable door securing the bill stacker, open;

FIG. 5 is a side elevation of a bill stacker in association with a bill validator with the drop down door closed;

FIG. 6 is a similar view with the drop down door open;

FIG. 7 is a similar view to FIG. 5 showing the coin casing together with the stacker and coin validator tilted rearwardly to permit servicing or removal of the bill validator.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a typical bill validator 1 arranged on top of a bill stacker 2. These are standard articles of commerce and are bought in by the slot machine manufacturer ready for installation. Bills are inserted in a receiving tray on top of the validator and after being validated are pressed down through a slot in the top of the stacker 2 for storage therein.

The slot machine shown in FIG. 2 has a casing 4 having the usual window 5, a coin slot 6 and a bill receiving slot 7. The casing 4 has a main or first lockable door 8 which is secured by means of the lock 9. Hinged from the first door 8 is a second lockable door 10 secured by the lock 11. The second lockable door 10 normally carries on its face a prize schedule which can be readily changed if the machine is to have its combination or game changed. It is illuminated by a fluorescent lamp 13 which is readily accessible for replacement. The opening of the second door 10 reveals the stacker 2 on which is mounted the validator 1 in the position shown in FIG. 1. Access to the stacker is secured by the drop down door 15 which can be lowered to a position shown in FIG. 4 after unlocking the lock 16.

The bill stacker 2 is contained within a casing 14 which is mounted for pivoting about the pivot 17. The coin validator is shown in chain lines and is mounted on top of the stacker and is held in position by means of pins 23 engaging slots 24 in an upward extension of the casing 14. The casing 14 is secured to the main structure of the slot machine by a screw (not shown) passing through holes indicated at 18.

If the validator 1 is to be serviced, a serviceman gains access to the interior of the machine by unlocking the lock 9 and opening the first door 8. On removal of the screw securing the casing 14 to the structure of the slot machine, the whole casing may be pivoted backwards about the pivot 17 as shown in FIG. 7. In this position the validator 1 may be removed and serviced or replaced.

It will be noted however that the bill stacker 2 cannot be removed from the casing 14 by reason of the fact that the drop down door 15 is still in position and secured by the lock 16.

The serviceman will have no access to the drop down door 15 because he will not have a key to the lock 15.

When a person authorized to remove the bill stacker from the machine is required to do so, he will open the second door 10 by unlocking the lock 11. He however will not have a key to the lock 9 and will therefore be denied access to the

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interior of the machine. On opening the second door 10 access is given to drop down door 15 which is released by operating the lock 16. On hinging the door 15 downwardly the cranked end of the door 15 acts through the link 19 to tilt an inner liner 20 forwardly causing it to pivot about the pivot point 21. When this is down the upper surface of the bill stacker 2 is brought out of contact with the bottom of the validator 1 and the bill stacker 2 may be readily removed. When this is replaced by a fresh bill stacker this is inserted into the inner liner 20 and the drop down door 15 closed. The act of closing the door brings the inner container back to the position shown in FIG. 5 and also presses the upper surface of the bill stacker 2 against the bottom of the coin validator 1. This applies pressure to the plate 22 causing it to compress the springs 25. The result of this is that when the bill stacker 2 is in the position shown in FIG. 5 the springs 25 will press it up against the bill validator 1 ensuring that these are in intimate contact and that bills will be passed properly from the bill validator 1 to the bill stacker 2. Once the drop down door 15 has been hinged upwardly the lock 16 is locked and the second door 10 closed and locked.

The apparatus described achieves the object of the invention in that, whereas an authorized person has access to and can remove a bill stacker he has no access to the interior of the machine and a serviceman requiring to service the bill validator has no access to the bill stacker.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without

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departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

I claim:

1. A slot machine comprising a cabinet, a first lockable door giving access to the interior of the cabinet, a second lockable door hingedly mounted in the first, a bill validator associated with a bill stacker arranged within the cabinet and supported in a housing, the housing having a lockable means controlling removal of the bill stacker from the housing, the said lockable means being accessible only through said second lockable door, the bill validator being accessible only through first lockable door for servicing or replacement.

2. A slot machine as claimed in claim 1 wherein the bill stacker is carried in an inner liner of the housing that is pivotable relation thereto, the bill stacker being maintained in a close functional relationship with the bill validator by spring means, the said lockable means being a drop down lockable door on the housing giving access to the bill stacker, the said dropped down door being connected to by link means to the inner liner whereby, an opening of the drop down door, the inner liner is caused to pivot in relation to the housing to move the bill stacker away from close contact with the validator and permit its removal.

3. A slot machine as claimed in claim 1 wherein the housing is pivotably mounted to facilitate servicing or replacement of the validator.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,700,195
DATED : December 23, 1997
INVENTOR(S) : Vladimir Halic

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, item [73], Assignee: should read--Aristocrat Leisure Industries PTY Ltd., Sydney, Australia--.

Signed and Sealed this
Tenth Day of March, 1998

Attest:



BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks

Primary Examiner—Harrison L. Hinson

Attorney, Agent, or Firm—Prangle, Dithmar, Vogel,
Sandler & Stotland

[57]

[22] Filed: Jan. 26, 1973

Packaging apparatus for garments such as panty hose includes a cylindrical conduit having an entry end and an exit end, and a Venturi air chest on the conduit for establishing a stream of air in the conduit to draw the garment into the conduit at the entry end and eject it into a bag or other container at the exit end. A funnel-shaped nozzle on the exit end of the conduit has an outer sleeve portion spaced radially outwardly from the conduit and cooperating with a clamping device for holding the open end of the bag in surrounding relationship with the conduit and spaced therefrom, perforations in the cone-shaped part of the nozzle permitting free flow of the air stream from the bag.

16 Claims, 5 Drawing Figures

References Cited

2,183,081 12/1939 McCallum 53/385



FIG. 1

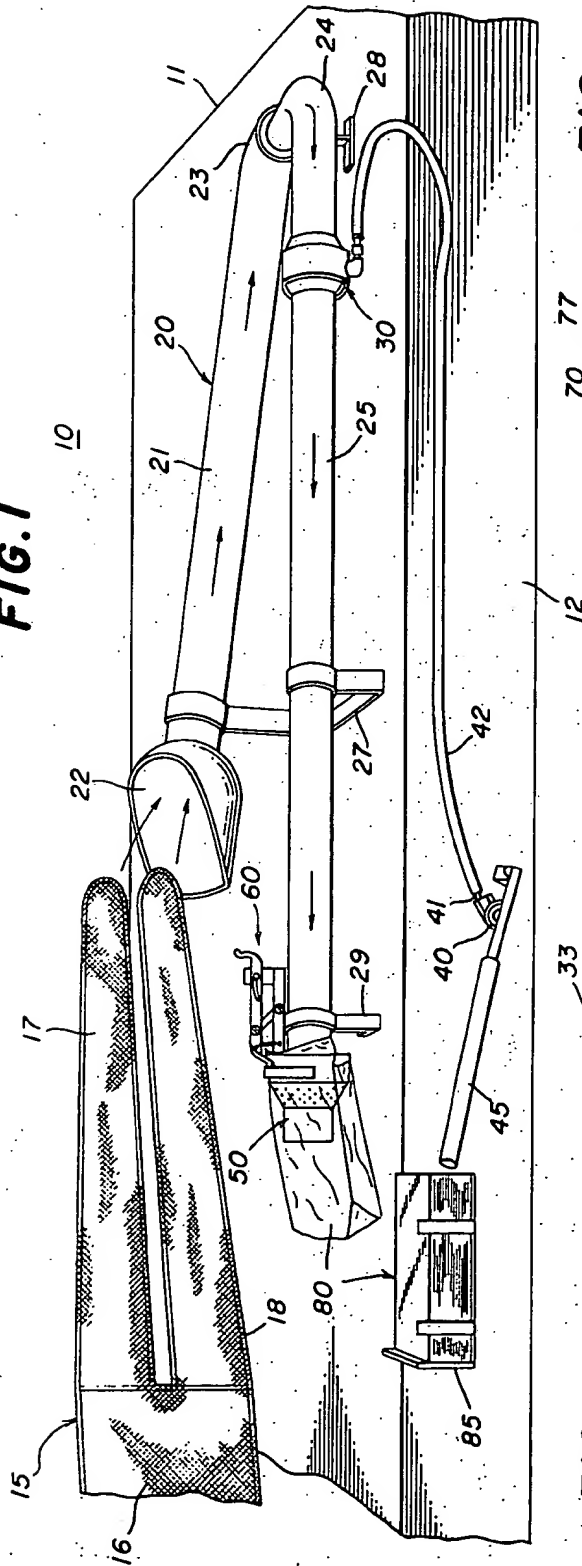


FIG. 5

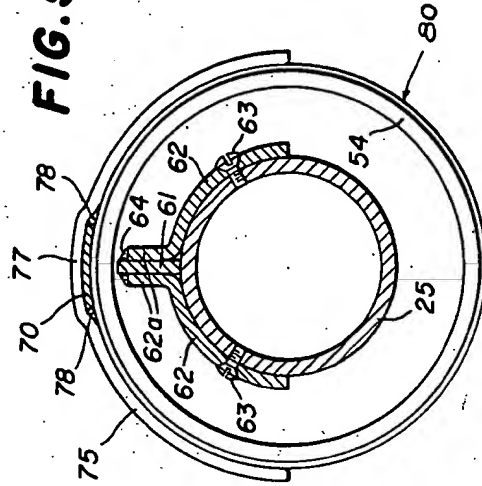


FIG. 2

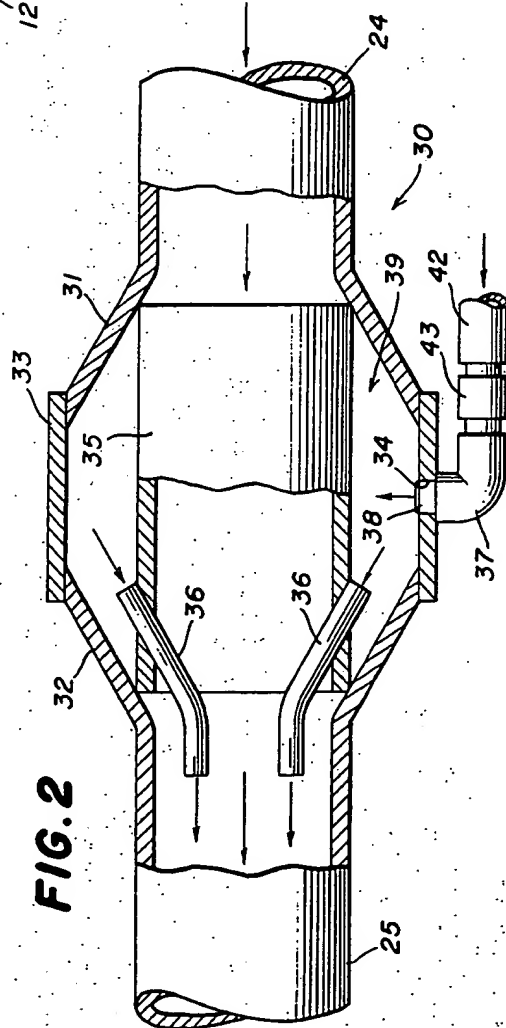


FIG. 3

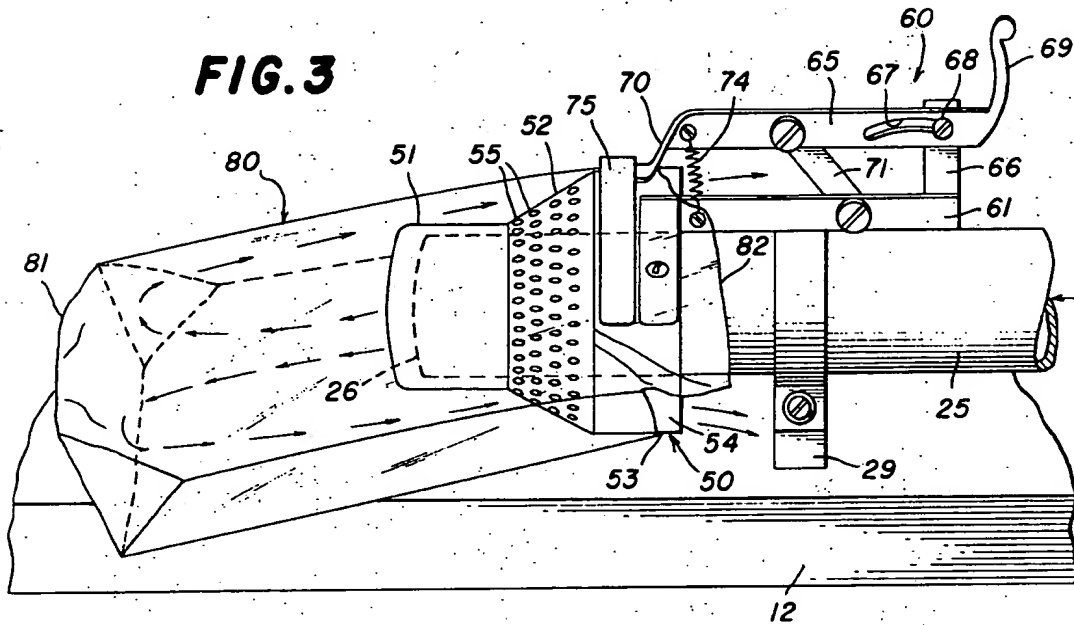
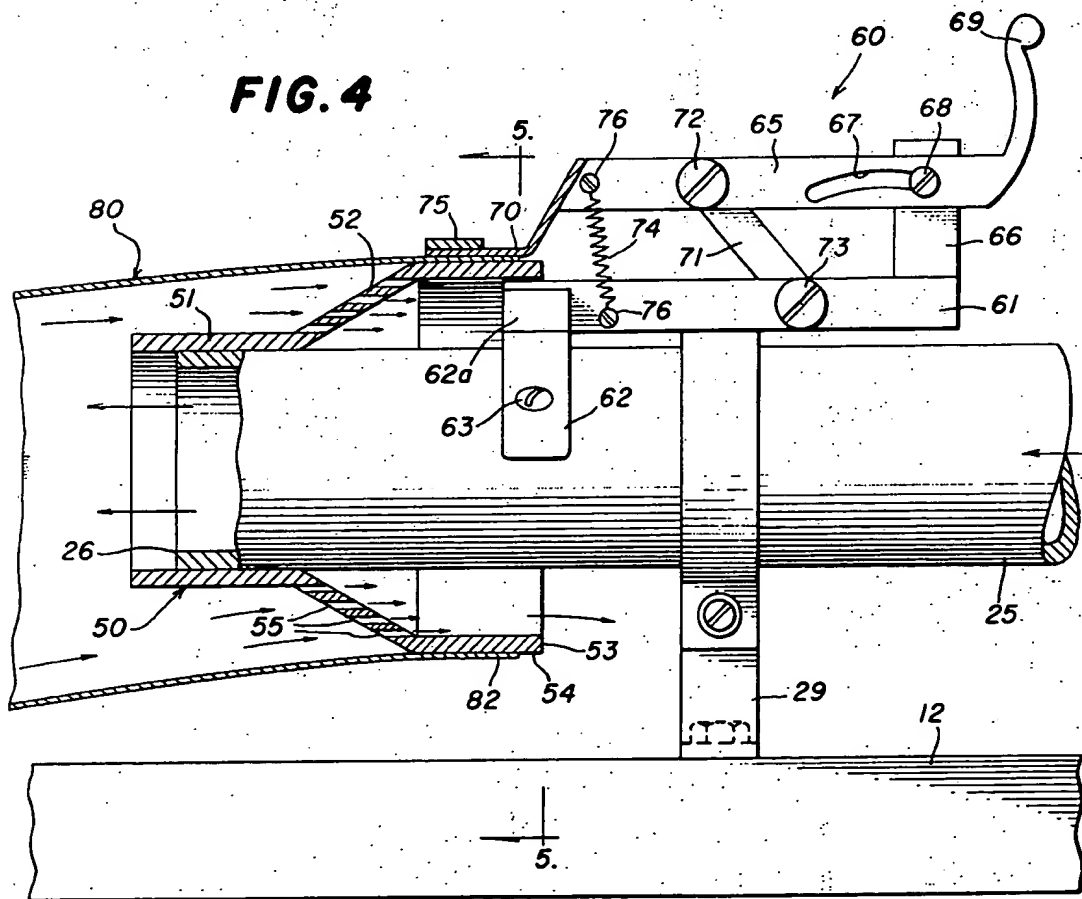


FIG. 4



1 PNEUMATIC PACKAGE LOADER

The present invention relates to pneumatic packaging apparatus for loading light-weight garments such as panty hose and the like into packaging containers. More particularly, this invention relates to a pneumatic conveyor system for delivering a garment from an inspection form to a container by means of an air stream flowing through the conduit.

In prior systems of this type, it has been found that it was necessary to maintain the bottom end of the container open during loading of the garment thereinto in order to permit full uninterrupted air flow and to facilitate easy entry of the garment into the container. It is a general object of the present invention to provide an air-operated container loading apparatus by which a garment may be loaded into a container open only at the top end thereof, while at the same time maintaining free flow of the airstream.

It is an important object of the present invention to provide pneumatic packaging apparatus for loading material to be packaged into an associated container open only at one end, the apparatus comprising a conduit accommodating passage of the material therethrough and having an entry end and an exit end, means coupled to the conduit for establishing therein a stream of air flowing from the entry end to the exit end thereby to create an area of reduced pressure at the entry end, the area of reduced pressure and the stream of air serving to draw the material into the conduit at the entry end and to eject the material from the conduit at the exit end, and holding means for releasably holding the associated container with the open end thereof in overlapping surrounding relationship with the exit end of the conduit and spaced therefrom, whereby the material is ejected from the exit end of the conduit into the container while the space between the container and the conduit accommodates the free flow of the airstream from the container.

In connection with the foregoing object, it is another object of this invention to provide pneumatic packaging apparatus of the type set forth, wherein the holding means comprises a stationary clamping member having a clamping surface spaced laterally from the conduit adjacent to the exit end thereof, and a movable clamping member mounted for movement between a clamping position and a releasing position, the movable clamping member in the clamping position thereof cooperating with the clamping surface to clamp therebetween the open end of the container to hold it in overlapping surrounding relationship with the exit end of the conduit and spaced therefrom, the movable clamping member in the releasing condition thereof being spaced from the clamping surface to accommodate removal of the container from therebetween after loading of the material into the container.

Another object of this invention is to provide pneumatic packaging apparatus of the type set forth, which includes a nozzle mounted on the conduit in concentric surrounding relationship therewith and including an inner annular sleeve portion and an outer annular sleeve portion and intermediate annular portion interconnecting said inner and outer portions, the inner annular sleeve portion being fixedly secured to the outer surface of the conduit adjacent to the exit end thereof, the outer annular sleeve portion being disposed in use radially outwardly of the conduit upstream of the inner

2 sleeve portion, the intermediate annular portion having a plurality of openings therein for accommodating free flow of air therethrough, and clamping means cooperating with the outer annular sleeve portion of the nozzle for releasably clamping therebetween the open end of the container for holding it in surrounding relationship with the exit end of the conduit spaced therefrom.

In connection with the foregoing object, still another object of this invention is to provide pneumatic packaging apparatus of the type set forth, wherein the holding means comprises a clamping member mounted adjacent to the exit end of the conduit and movable between a clamping position cooperating with the outer surface of the outer annular sleeve portion to clamp therebetween the open end of the container and a releasing position spaced from the outer annular sleeve portion to accommodate removal of the filled container from therebetween, and bias means resiliently urging the clamping member toward the clamping position thereof.

Further features of the invention pertain to the particular arrangement of the parts of the packaging apparatus whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

FIG. 1 is a front perspective view of the packaging apparatus constructed in accordance with and embodying the features of the present invention, showing the orientation of the apparatus with respect to associated equipment;

FIG. 2 is an enlarged fragmentary view in partial vertical section of the Venturi air chest for establishing the air stream in the conduit of the present invention;

FIG. 3 is an enlarged fragmentary front perspective view rotated 90° of the exit end of the conduit of FIG. 1, showing a container clamped in a loading position between the clamping mechanism and the nozzle;

FIG. 4 is a further enlarged fragmentary front elevational view in partial vertical section and rotated 90° showing the container held in its loading position; and

FIG. 5 is a view in horizontal section taken along the line 5-5 in FIG. 4.

There is illustrated in the drawings a packaging apparatus, generally designated by the numeral 10, constructed in accordance with and embodying the features of the present invention and adapted for conveying material to be packaged, such as panty hose or other garments or the like, from an inspection form 15 or other apparatus into a container 80. For simplicity of illustration, the packaging apparatus 10 has been illustrated in FIG. 1 as being mounted on walls 11 and 12 adjacent to the corner of a room, but it will be appreciated that in actual use any suitable arrangement of the packaging apparatus may be utilized.

In the preferred embodiment of the invention, the apparatus 10 is adapted for loading panty hose from an inspection form 15 into a bag, the inspection form 15 having a waist portion 16 and a pair of leg portions 17 and 18 for receiving the panty hose thereover to facilitate inspection thereof in a well-known manner. The apparatus 10 is adapted for assisting in removing the

panty hose from the inspection form 15 after completion of the inspection and for transporting the panty hose to and into the container 80.

The packaging apparatus 10 includes an elongated cylindrical conduit, generally designated by the numeral 20, substantially circular in transverse cross section and having an entry end and an exit end. The conduit 20 comprises a plurality of interconnected conduit sections, including a first generally vertically extending section 21 having a funnel 22 secured thereto at the lower or entry end thereof adjacent to the top of the inspection form 15, the conduit section 21 being provided with a right angle bend or elbow portion 23 at the upper end thereof. Coupled to the upper end of the conduit section 21 by a fluid tight coupling is a right angle elbow section 24, the free end of which extends substantially vertically downwardly and is coupled through a Venturi air chest, generally designated by the numeral 30, to the upper end of an elongated substantially vertically-extending straight conduit section 25, the lower end of which is the exit end of the conduit 20. The conduit 20 is mounted in place on the walls 11 and 12 by means of a main mounting bracket 27 secured to the conduit section 21 and 25, and by an upper mounting bracket 28 secured to either the elbow section 24 or to the bend portion 23 of the conduit section 21, and finally by a lower mounting bracket 29 secured to the conduit section 25 adjacent to the exit end thereof, each of the brackets 27, 28 and 29 being fixedly secured to the walls 11 and 12 by bolts or other suitable fasteners.

The Venturi air chest 30 forms a coupling between the conduit sections 24 and 25, the conduit section 24 having a downwardly and outwardly flared generally cone-shaped flange 31 at the lower end thereof and the conduit section 25 having an outwardly and upwardly flared generally cone-shaped flange 32 at the upper end thereof. Interconnecting the flanges 31 and 32 and fixedly secured as by welding to each in surrounding relationship therewith is a cylindrical sleeve 33 having a port or opening 34 therein. The flanges 31 and 32 and the sleeve 33 cooperate to define a chamber 39 therein in which is disposed a cylindrical conduit section 35 substantially identical in transverse cross section to the conduit section 25 and the downwardly extending portion of the elbow section 24 and coaxial with each, the upper and lower ends of the conduit section 35 being respectively engaged along the entire circumferences thereof with the flanges 31 and 32 for forming a fluid-tight seal between the interior and exterior of the conduit section 35. A plurality of port tubes 36 are equidistantly spaced about the conduit section 35 and are fixedly mounted thereon, the port tubes 36 being respectively received in complementary openings through the wall of the conduit section 35 with each port tube 36 having an upper end communicating with the space between the conduit section 35 and the sleeve 33 and a lower end projecting downwardly below the bottom end of the conduit section 35 and into the conduit section 25 and communicating with the interior thereof.

A pneumatic elbow fitting 37 is mounted on the sleeve 33 and has a nozzle end 38 received in the opening 34 in the sleeve 33 for providing communication between the interior of the fitting 37 and the space between the conduit section 35 and the sleeve 33. The fitting 37 is coupled by means of a coupler 43 to one end

of a pneumatic conduit 42, the other end of which is coupled by means of a coupler 41 to an air control valve 40, the valve 40 having an actuating handle 45 for ready access by an operator of the packaging equipment. Preferably, the control valve 40 is coupled to an associated source of compressed air (not shown), the valve 40 being operable between a closed position for shutting off the air supply and an open position for admitting compressed air from the source into the conduit 42.

Mounted on the conduit section 25 at the exit end thereof is a generally funnel-shaped nozzle, generally designated by the numeral 50, and including a cylindrical inner sleeve portion 51 having an inner diameter slightly greater than the outer diameter of the conduit section 25 and fitted over the exit end thereof in coaxial surrounding relationship therewith and being fixedly secured thereto by suitable fastening means. Integral with the upper end of the inner sleeve portion 51 and extending upwardly and outwardly therefrom is a generally part-conical flared portion 52 provided with a plurality of passages or openings 55 extending there-through around the entire circumference thereof. Integral with the upper end of the flared portion 52 and extending upwardly therefrom coaxially with the conduit section 25 and with the inner sleeve portion 51 is an outer cylindrical sleeve portion 54 disposed in use a predetermined distance radially outwardly of the outer surface of the conduit section 25, the outer sleeve portion 53 being provided with an outer cylindrical clamping surface 54.

Mounted on the conduit section 25 adjacent to the nozzle 50 is a clamping mechanism, generally designated by the numeral 60. The clamping mechanism 60 includes a main brace or support member 61 extending vertically along the outer surface of the conduit section 25, the lower end of the brace member 61 being fixedly secured as by weldments 64 to attachment flanges 62a of a pair of mounting brackets 62, which are in turn respectively secured to the conduit section 25 by fasteners 63 such as screws or the like. To provide additional stability, the brace member 61 may also be secured by suitable means to the mounting bracket 29 of the conduit section 25.

Connected to the main brace member 61 at the upper end thereof and extending outwardly therefrom substantially normal thereto away from the conduit section 25 is a mounting arm 66 having attached thereto and projecting therefrom a screw 68 which is received through an arcuate slot 67 in an elongated actuator arm 65 which is disposed substantially parallel to the main brace member 61. The head of the screw 68 has a diameter greater than the width of the slot 67 to maintain the actuator arm 65 in place with respect to the mounting arm 66. Integral with the actuator arm 65 at the upper end thereof and extending therefrom generally normal thereto is a handle 69 for manual operation of the clamping mechanism 60. Integral with the actuator arm 65 at the lower end thereof and extending downwardly and inwardly therefrom is an attachment foot 70 fixedly secured at the lower end thereof as by welding to an arcuate clamping collar 75. More particularly, the clamping collar 75 is generally part-cylindrical and is shaped complementary to the clamping surface 74 on the nozzle 50, the clamping collar 75 having a depression 77 therein intermediate the ends thereof in which is received the lower end of the attach-

ment foot 70 so that the inner surface of the attachment foot 70 is flush with the inner surface of the clamping collar 75.

Extending downwardly and outwardly from the main brace member 61 to the actuator arm 65 is a crossbar 71 having the opposite ends thereof respectively pivotally connected to the actuator arm 65 and the main brace member 61 by means of pivot pins or screws 72 and 73. A helical tension spring 74 has the opposite ends thereof respectively anchored on the lower ends of the actuator arm 65 and the main brace member 61 by means of anchor screws 76, the spring 74 serving resiliently to urge the actuator arm 65 and the clamping collar 75 into a clamping position illustrated in the drawings, wherein the inner surface of the clamping collar 75 is urged toward engagement with the complementary clamping surface 54 on the nozzle 50 for cooperation therewith to clamp therebetween the upper end of a container 80 as will be explained more fully below.

It will be appreciated that by use of the handle 69, the actuator arm 65 and the clamping collar 75 may be manually moved, against the urging of the tension spring 74, from the clamping position to a releasing position (not shown) wherein the clamping collar 75 is spaced a predetermined distance from the clamping surface 54 on the nozzle 50. More particularly, in moving the clamping mechanism 60 from the clamping position to the releasing position thereof, the actuator arm is lifted upwardly by the handle 69, with the screw 68 sliding along the slot 67, whereby the actuator arm 65 and the clamping collar 75 undergo a generally arcuate motion upwardly and outwardly away from the clamping surface 54, the main brace 61 and the actuator arm 65 and the crossbar 71 cooperating to form a parallelogram-type linkage.

The operation of the packaging apparatus 10 will now be described in detail. Mounted on the wall 12 is a container rack 85 supporting thereon a supply of empty containers 80. In the preferred embodiment of the invention, the containers 80 are bags which may be of paper, plastic or other suitable material and are stored in a flat folded condition on the rack 85. Normally, the apparatus will be operated by a single operator whose job it is to inspect and bag the finished panty hose garment. Initially, the operator will remove a bag from the rack 85 and unfold it to its open position and mount the bag 80 on the nozzle 50. In order to perform this operation, the operator moves the clamping mechanism 60 to its releasing position by lifting on the handle 69 and then inserts the open upper end 82 of the bag 80 over and around the nozzle 50 in surrounding relationship therewith so that the upper end 82 of the bag 80 overlaps the clamping surface 54 on the nozzle 50 around the entire circumference thereof. Then, the clamping mechanism 60 is returned to its clamping position, in which the clamping collar 75 will cooperate with the clamping surface 54 on the nozzle 50 securely to clamp the upper end 82 of the bag therebetween. Preferably, the bag 80 will be mounted so that the upper end 82 thereof extends well above the top edge of the nozzle 50 to insure a firm and secure mounting of the bag so that no part of the lip thereof will be pulled off the nozzle during operation.

After the bag 80 has been mounted in place over the nozzle 50, the panty hose garment is stretched over the inspection form 15 and inspected in the usual manner,

after which the operator starts to pull the feet of the panty hose off the inspection form leg portions 17 and 18 and operates the control valve lever handle 45 to open the valve 40 for a short time. Upon opening of the valve 40, a blast of compressed air is admitted to the Venturi air chest 30 through the conduit 42, the compressed air stream then passing via the port tubes 36 downwardly into the conduit section 25 in the direction of the arrows in FIG. 2. The porting of the compressed air in the Venturi air chest 30 causes a stream of air to flow in the conduit 20 in the direction indicated by the arrows in the drawing. This air flow reduces the air pressure at the funnel 22, causing a partial vacuum which draws the toes of the panty hose up into the conduit 20 to aid in the removal of the panty hose garment from the inspection form 15. After the garment has been released from the inspection form 15, it is carried along by the airstream the length of the conduit 20 in the direction of the arrows and is ejected from the conduit 20 at the exit end thereof and blown into the bag 80.

It is a significant feature of the present invention that even though the bag 80 has the bottom end thereof closed and has the top end thereof tightly clamped about the outer sleeve portion 53 of the nozzle 50, nevertheless the apparatus 10 accommodates the free and unobstructed flow of the airstream through and from the conduit 20 and into and from the container 80 and provides for easy entry of the garment into the bag. More particularly, the openings 55 in the flared portion 52 of the nozzle 50 provide a path for the airstream to leave the bag 80 in the direction of the arrows in FIG. 3 to provide the necessary uninterrupted flow of the airstream.

After the garment has entered the bag 80, the clamping mechanism 60 is again moved to its releasing position by the operator in the manner described above, and the filled bag 80 is removed from the nozzle 50 for sealing or other further processing. The operator then mounts another bag 80 in position on the nozzle 50 in the manner described above, and is ready for the inspection and bagging of another garment.

While, in the preferred embodiment of the invention, the container 80 illustrated as being a bag, it will be appreciated that other types of containers could be used. In like manner nozzles having shapes and sizes different from the nozzle 50 could also be used. In a construction model of the packaging apparatus 10 of the present invention, the conduit 20 is preferably formed of a plastic tubing, but it will be understood that other suitable materials may be used for the conduit 20 as well as for the funnel 22 and the nozzle 50.

From the foregoing, it can be seen that there has been provided an improved pneumatic packaging apparatus which affords quick and easy loading of material such as light-weight garments into a container such as a bag, which has the bottom end thereof closed.

More particularly, there has been provided a pneumatic packaging apparatus which provides for the loading of a closed-end container while accommodating the free uninterrupted flow of the airstream to insure quick and unobstructed loading of the material into the container.

In addition, there has been provided an improved nozzle to afford the above advantages and a unique clamping mechanism to hold the container in loading position on the packaging apparatus.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. Pneumatic packaging apparatus for loading material to be packaged into an associated container open only at one end, said apparatus comprising a conduit accommodating passage of the material therethrough and having an entry end and an exit end, means coupled to said conduit for establishing therein a stream of air flowing from said entry end to said exit end thereby to create an area of reduced pressure at said entry end, said area of reduced pressure and said stream of air serving to draw the material into said conduit at said entry end and to eject the material from said conduit at said exit end, and holding means for releasably holding the associated container with the open end thereof spaced from said conduit and encompassing said conduit upstream of said exit end thereof, whereby the material is ejected from said exit end of said conduit into the container while the space between the container and said conduit accommodates the free flow of the air stream from the container.

2. The pneumatic packaging apparatus set forth in claim 1, wherein said means for establishing a stream of air in said conduit includes a port providing communication between the interior of said conduit intermediate the ends thereof and an associated source of compressed air for introducing a jet of compressed air into said conduit.

3. The pneumatic packaging apparatus set forth in claim 1, wherein said means for establishing a stream of air in said conduit comprises a Venturi air chest adapted to be coupled to an associated source of compressed air, and an actuating valve connected between said air chest and the associated source of compressed air for selectively admitting compressed air into said air chest.

4. The pneumatic packaging apparatus set forth in claim 1, and further including a funnel coupled to said conduit at the entry end thereof for facilitating the introduction of material to be packaged into said conduit.

5. The pneumatic packaging apparatus set forth in claim 1, wherein the associated container comprises a bag.

6. The pneumatic packaging apparatus set forth in claim 1, wherein said conduit is substantially circular in transverse cross section.

7. Pneumatic packaging apparatus for loading material to be packaged into an associated container open only at one end, said apparatus comprising a conduit accommodating passage of the material therethrough and having an entry end and an exit end, means coupled to said conduit for establishing therein a stream of air flowing from said entry end to said exit end thereby to create an area of reduced pressure at said entry end, said area of reduced pressure and said stream of air serving to draw the material into said conduit at said entry end and to eject the material from said conduit at said exit end, a stationary clamping member having a clamping surface spaced laterally from said conduit adjacent to the exit end thereof, and a movable clamping member mounted for movement between a clamp-

ing position and a releasing position, said movable clamping member in the clamping position thereof cooperating with said clamping surface for clamping therebetween the open end of the associated container to hold it spaced from said conduit and encompassing said conduit upstream of said exit end thereof, said movable clamping member in the releasing position thereof being spaced from said clamping surface to accommodate removal of the container from therebetween after loading of the material into the container, whereby the material is ejected from said exit end of said conduit into the container while the space between the container and said conduit accommodates the free flow of the air stream from the container and with movement of said movable clamping member to the releasing position thereof accommodating removal of the filled container.

8. The pneumatic packaging apparatus set forth in claim 7, wherein said conduit is substantially circular in transverse cross section, the associated container comprising a bag.

9. The pneumatic packaging apparatus set forth in claim 7, wherein said clamping members are mounted on said conduit.

10. The pneumatic packaging apparatus set forth in claim 7, and further including bias means resiliently urging said movable clamping member toward the clamping position thereof.

11. Pneumatic apparatus for loading material to be packaged into an associated container open only at one end, said apparatus comprising a cylindrical conduit accommodating passage of the material therethrough and having an entry end and an exit end, means coupled to said conduit for establishing therein a stream of air flowing from said entry end to said exit end thereby to create an area of reduced pressure at said entry end, said area of reduced pressure and said stream of air serving to draw the material into said conduit at said entry end and to eject the material from said conduit at said exit end, a nozzle mounted on said conduit in concentric surrounding relationship therewith and including an inner annular sleeve portion and an outer annular sleeve portion and an intermediate annular portion interconnecting said inner and outer portions, said inner sleeve portion being fixedly secured to the outer surface of said conduit adjacent to the exit end thereof, said outer sleeve portion being disposed in use radially outwardly of said conduit upstream of said inner sleeve portion, said intermediate portion having a plurality of openings therein for accommodating the free flow of air therethrough, and clamping means cooperating with said outer sleeve portion for releasably clamping therebetween the open end of the container to hold it in overlapping surrounding relationship with said exit end of said conduit and spaced therefrom, whereby the material is ejected from said exit end of said conduit into the container while the perforations in said intermediate portion of said nozzle accommodate free flow of the air stream from the container.

12. The pneumatic packaging apparatus set forth in claim 11, wherein said nozzle is generally funnel-shaped with said inner and outer sleeve portions being substantially cylindrical and with said intermediate annular portion being part-conical in shape.

13. Pneumatic packaging apparatus for loading material to be packaged into an associated container open only at one end, said apparatus comprising a cylindrical

conduit accommodating passage of the material there-
through and having an entry end and an exit end,
means coupled to said conduit for establishing therein
a stream of air flowing from said entry end to said exit
end thereby to create an area of reduced pressure at
said entry end, said area of reduced pressure and said
stream of air serving to draw the material into said con-
duit at said entry end and to eject the material from
said conduit at said exit end, a nozzle mounted on said
conduit in concentric surrounding relationship there-
with and including an inner annular sleeve portion and
an outer annular sleeve portion and an intermediate an-
nular portion interconnecting said inner and outer por-
tions, said inner sleeve portion being fixedly secured to
the outer surface of said conduit adjacent to the exit
end thereof, said outer sleeve portion being disposed in
use radially outwardly of said conduit upstream of said
inner sleeve portion, said intermediate portion having
a plurality of openings therein for accommodating the
free passage of air therethrough, a clamping member
spaced outwardly of said outer sleeve portion and being
movable between a clamping position and a releasing
position, and bias means coupled to said clamping
member for resiliently urging said clamping member
toward the clamping position thereof, said clamping
member in the clamping position thereof cooperating
with said outer sleeve portion of said nozzle for clamp-
ing therebetween the open end of the associated con-

tainer to hold it in overlapping surrounding relationship
with said exit end of said conduit, said clamping mem-
ber in the releasing condition thereof being spaced
from said outer sleeve portion of said nozzle to accom-
modate removal of the container from therebetween
after loading of the material into the container,
whereby the material is ejected from said exit end of
said conduit into the container while the space between
the container and said conduit accommodates the free
flow of the airstream from the container and with
movement of said clamping member to the releasing
position thereof accommodating removal of the filled
container.

14. The pneumatic packaging apparatus set forth in
claim 13, wherein said bias means comprises a tension
spring.

15. The pneumatic packaging apparatus set forth in
claim 13, wherein said outer sleeve portion of said noz-
zle is substantially cylindrical in shape, said clamping
member including a part-cylindrical clamping surface
shaped complementary to said outer sleeve portion.

16. The packaging apparatus set forth in claim 13,
and further including a parallelogram type linkage cou-
pled to said clamping member and being manually op-
erable for effecting movement of said clamping mem-
ber from the clamping position to the releasing position
thereof.

* * * * *



US005709069A

United States Patent [19]**Cronauer**[11] **Patent Number:** **5,709,069**[45] **Date of Patent:** **Jan. 20, 1998**[54] **PACKAGING MACHINE AND METHOD**[75] **Inventor:** William M. Cronauer, Tallmadge, Ohio[73] **Assignee:** Automated Packaging Systems, Inc., Streetsboro, Ohio[21] **Appl. No.:** 804,125[22] **Filed:** Feb. 20, 1997[51] **Int. Cl.⁶** B65B 39/04; B65B 43/12; B65B 43/26; B65B 43/36[52] **U.S. Cl.** 53/459; 53/469; 53/570; 53/385.1; 53/389.2[58] **Field of Search** 53/459, 469, 570, 53/578, 385.1, 389.2, 389.1[56] **References Cited****U.S. PATENT DOCUMENTS**

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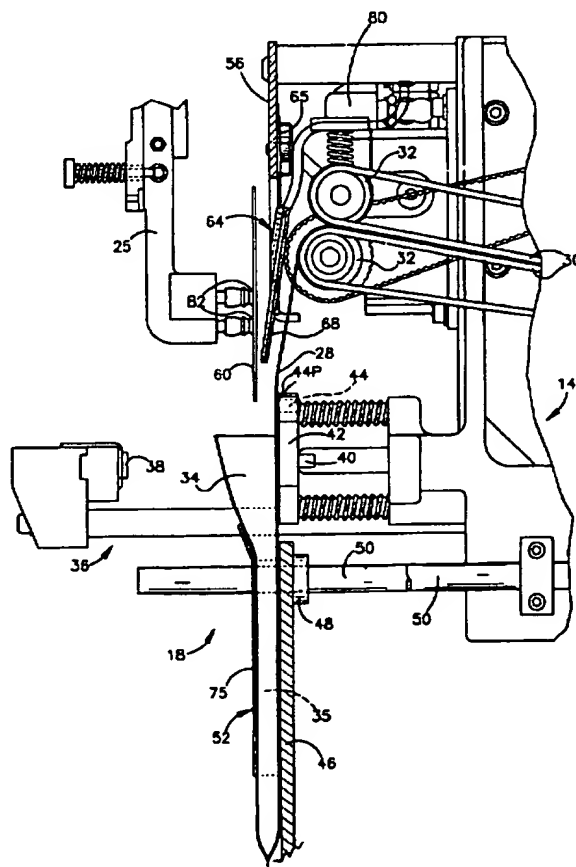
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[57]

ABSTRACT

A system for packaging thin products such as compact discs in plastic bags is disclosed. A CD dispenser is used in combination with a known but modified bagging machine. The modifications include an improved guide arrangement for guiding a gravity fed disc toward an open bag and a load station which includes a tunnel housing the open bag and of only slightly greater thickness dimension than the bag including the product to be packaged. As an end bag of a web of interconnected, preopened bags is fed into the tunnel, a flow of air is established behind the web to create a film of air spacing the back of the end bag from a wall of the tunnel. The flow of air also has the unexpected property of creating a venturi like effect to draw the end bag away from a front wall of the tunnel. A method of packaging thin objects such as compact discs is also disclosed.

30 Claims, 4 Drawing Sheets

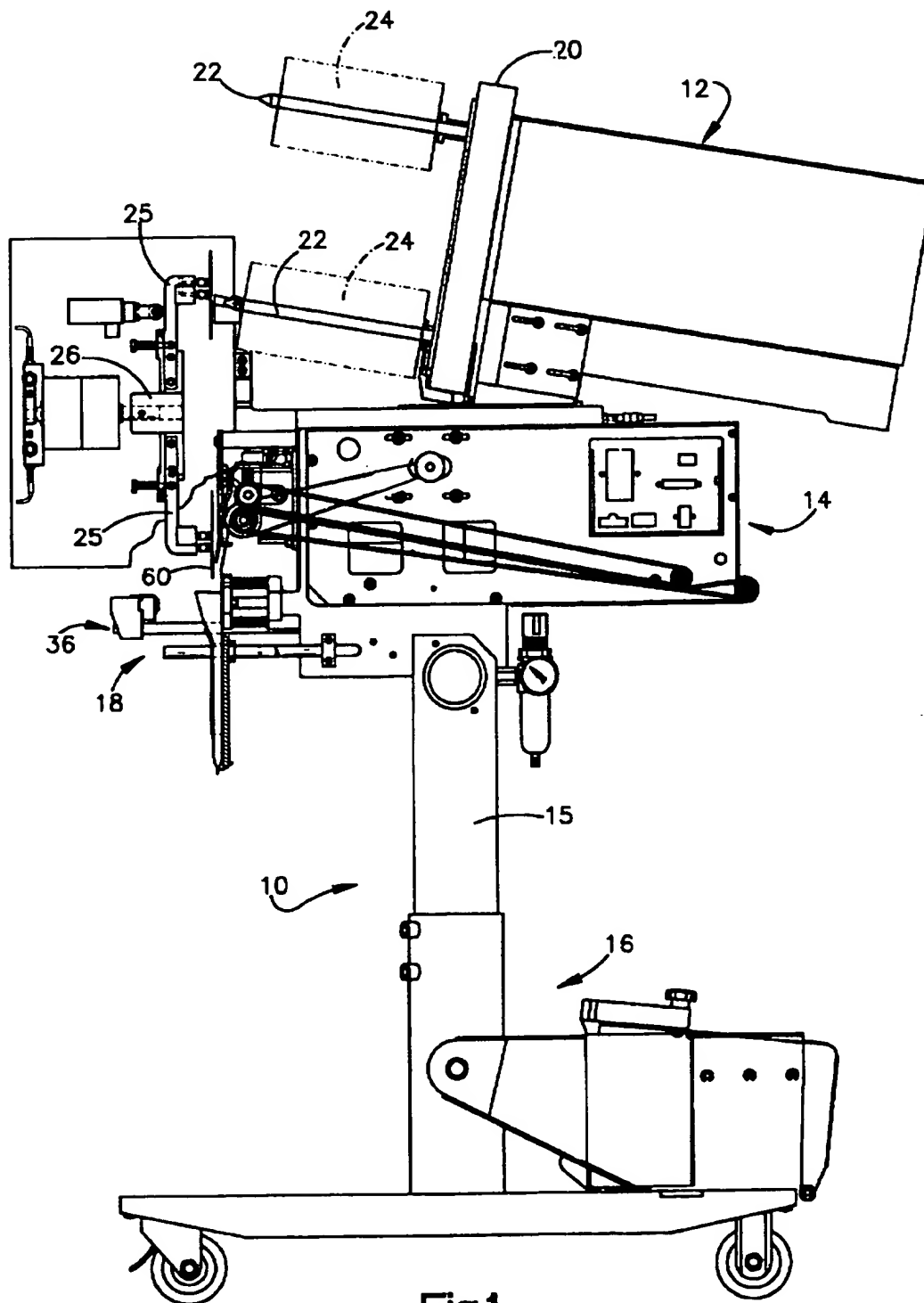


Fig.1

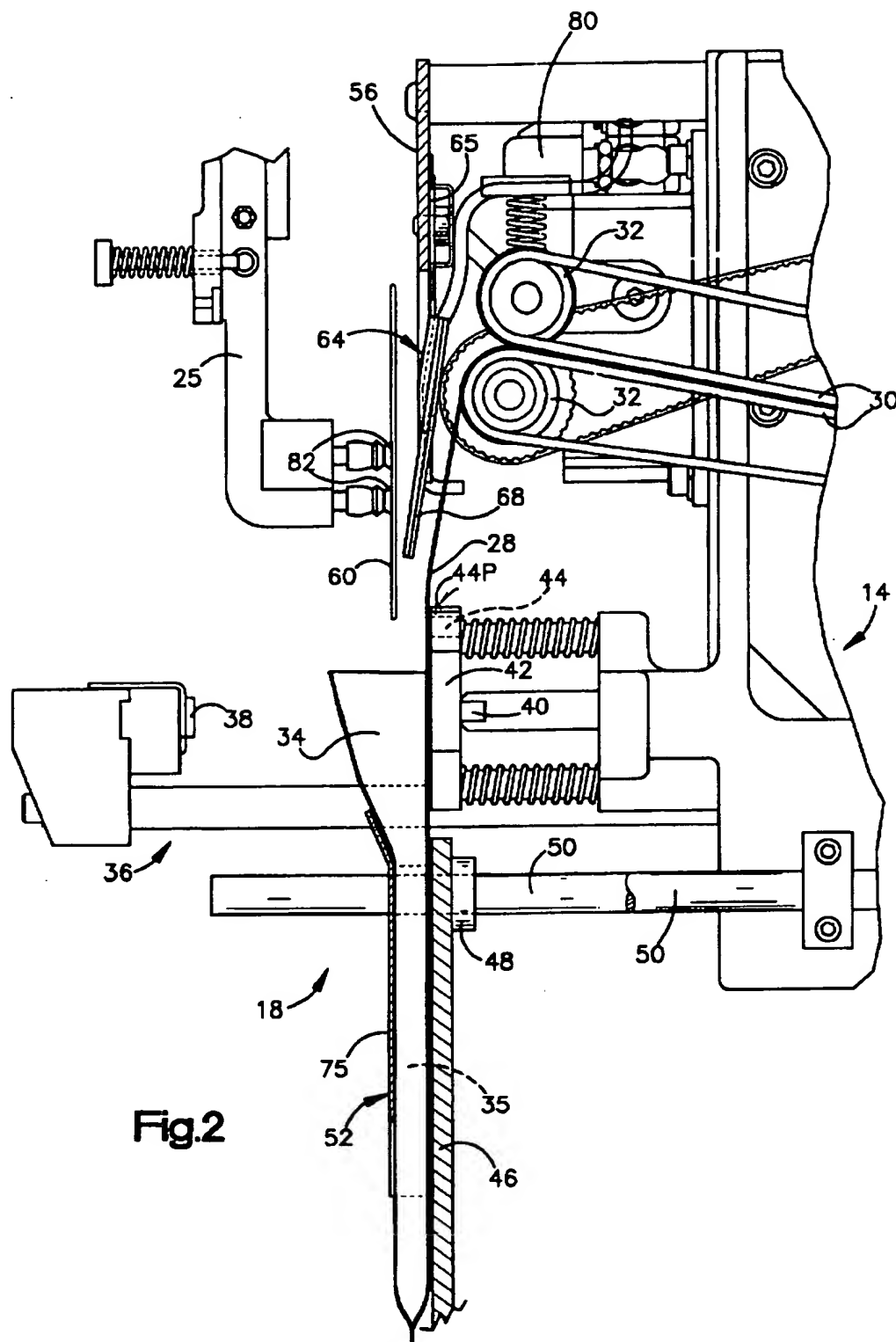
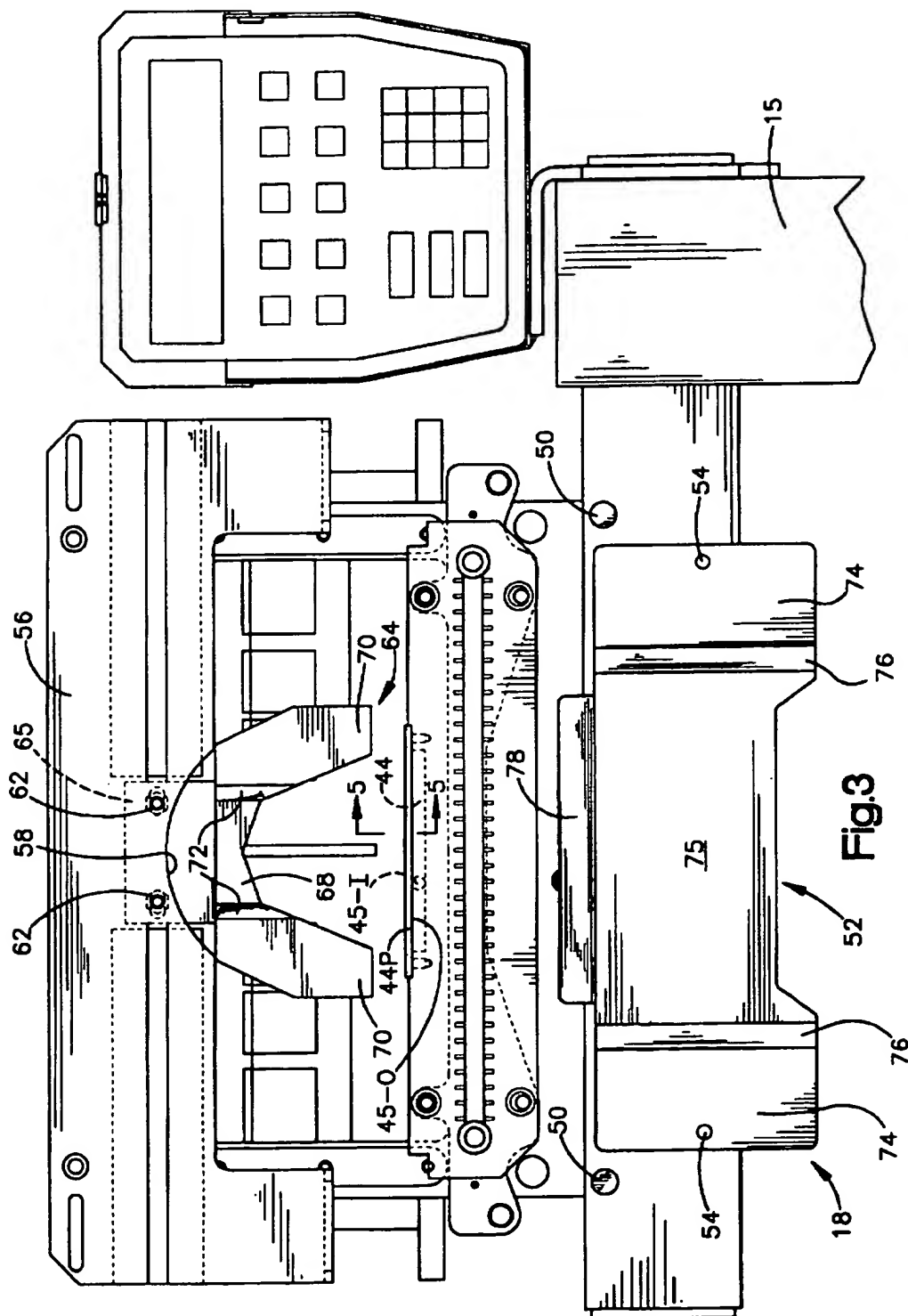
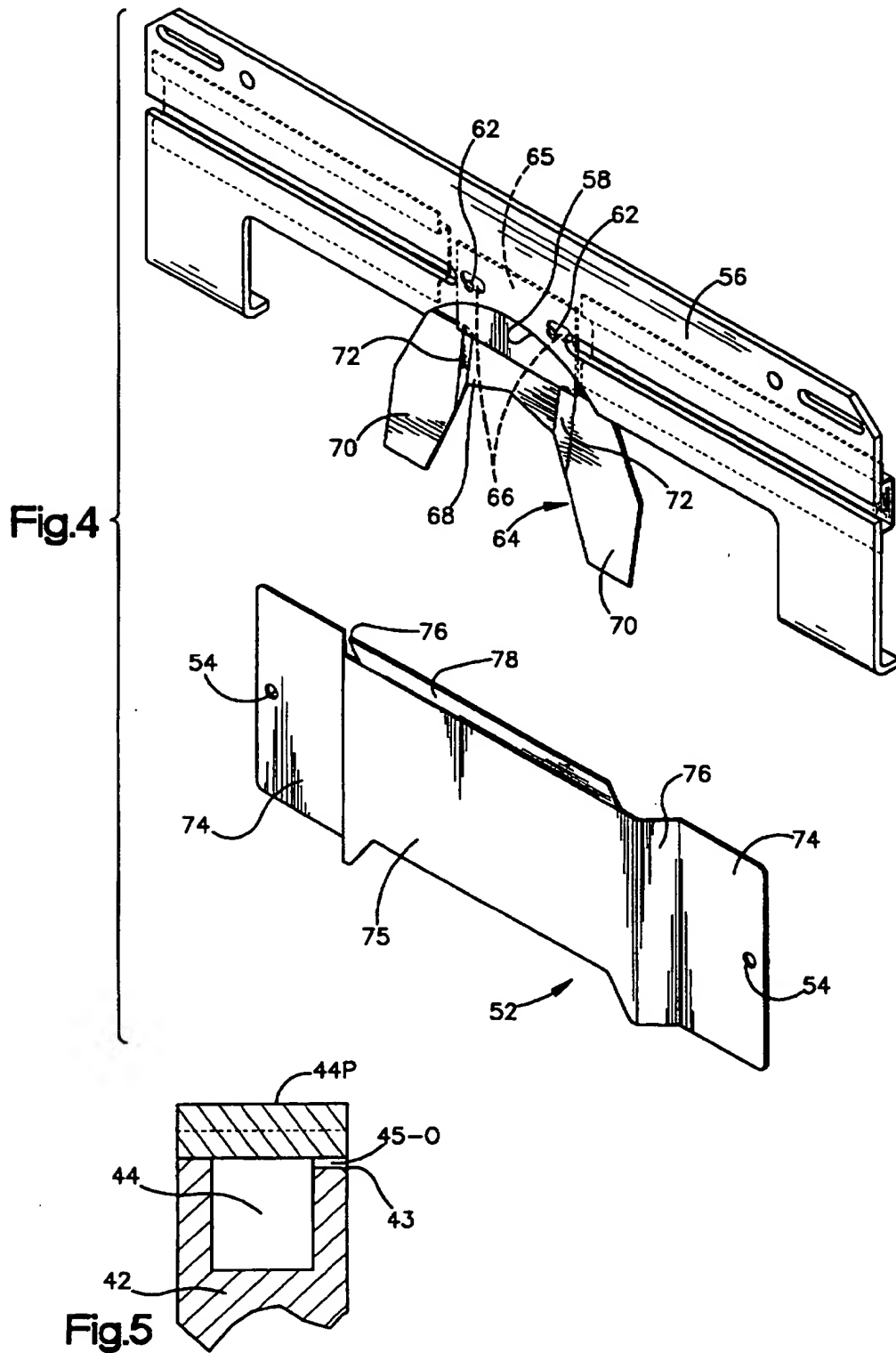


Fig.2





PACKAGING MACHINE AND METHOD

This invention relates to packaging and more particularly to a novel and improved method and apparatus for packaging discs.

BACKGROUND OF THE INVENTION

Compact discs, now known simply as "CD's", frequently are individually packaged in cardboard, envelope like, containers. On other occasions the packaging is more sophisticated utilizing such things as hinged plastic enclosures with a CD positioning insert.

Plastic films are now widely utilized in packaging. Such packages are advantageous for many applications because when clear plastic is used its clarity permits visual inspection of the contents, the plastics are readily printable and they are inexpensive. While plastic film packages have enjoyed popularity, they have not been used for packaging thin disc products such as CD's, primarily because there has been no effective, inexpensive method and apparatus for packaging them. Accordingly, it would be advantageous if there existed an efficient and inexpensive method and apparatus for providing individual plastic packages for CD's.

SUMMARY OF THE INVENTION

The machine of the present invention utilizes a novel and improved load station assembly mounted on a bagging machine sold by the assignee of this patent under the designation HS-100 Excel. The current machine, while modified and improved, is nonetheless essentially the machine described and claimed in U.S. Pat. No. 5,394,676, issued May 7, 1995, under the title Packaging Machine and Method (here the Excel Patent). The Excel Patent is incorporated by reference in its entirety.

A CD dispenser is mounted atop the Excel machine. The dispenser is described and claimed in a concurrently filed application entitled Disc Packaging Machine & Method, attorney's docket 14-171 (herein the Dispenser Patent). The Dispenser Patent is hereby incorporated by reference in its entirety.

With the machine of the Excel Patent an elongated web or chain of interconnected preopened bags is fed sequentially to position each end one of bags in a load station. Once the positioned bag has received a product it typically is closed and sealed and separated from the web such that a package is formed.

With the machine of the present invention a novel and improved load station is provided. As an end bag of the web is fed out of the machine it is gravity positioned in a tunnel which delineates the load station. The tunnel is of a width larger than the bags being fed and a thickness only slightly greater than the thickness of the bags plus a thin product to be packaged.

An air guide is positioned under the web path of travel to direct a flow of air downwardly between a plate delineating the back of the tunnel and a bag being fed into the load station. Air flow from the air guide creates a lubricating film of air between a bag being fed into the tunnel and a backing plate defining the back of the tunnel.

Unexpectedly the coaction of the flow of air from the air guide on the bag as it enters the tunnel is effective to maintain the bag out of contact with a plate defining the front of the tunnel as a bag is fed to the load station. Once a bag is positioned in the tunnel for loading, air flow from the air guide is terminated. The air guide includes a transversely

elongate plenum with an elongated thin outlet. The outlet has its longitudinal dimension which is orthogonal to the web path of travel. The outer edge of a body defining the bottom of the outlet is radiused so escaping air follows the surface in a wing foil like action.

In prior Excel machines the air guides function to assure that the web path of travel is away from the machine and that descending bags will not hang up on parts of the Excel machine. Here the air flow from the air guide assures that an end bag of the web will not only feed into the tunnel, but will do so without contacting walls of the tunnel. Without the flow of air from the air guide bags will not feed into the tunnel.

The tunnel is defined by a formed metal tunnel plate connected to the backing plate. The backing plate is fixed to the machine. The backing plate is a standard plate used for other applications modified to provide a mounting for the tunnel plate.

A support plate is provided above the web path. The support plate differs from a standard plate used on Excel machines in that it has an arcuate cut out to protect against contact with the face of the disc. The support plate also differs in that it is modified to support a guide plate. The guide plate serves to guide a gravity deposited disc into a positioned and opened bag in the tunnel. The guide plate is designed to engage edges of the disc and avoid contact with the disc face which is the data storage side of the CD.

The tunnel plate has end mounting portions juxtaposed against and secured to the backing plate. An offset central portion is spaced from the backing plate a distance only slightly greater than the thickness of the bag and a disc to be packaged. The tunnel plate includes an upwardly and outwardly flaring guide portion connected to the central portion to assure that a bag being fed into the load station and a disc dropped into a positioned bag are guided into the tunnel and, in the case of the disc, into an open bag. Intermediate outwardly flaring side sections connect the central portion to the end mounting portions and delineate the sides of the tunnel which in the preferred and disclosed embodiment has a width only slightly larger than a bag being loaded and sealed to form a package. Since the side sections flare outwardly from the central portion, any contact with a CD being dropped into a bag will be with a rearward edge and not the delicate face of the CD.

In operation bags are fed from a bagging machine in the usual manner. As an end bag of the web descends from output rolls of the bagger, the air guide behind the web path of travel emits a downward flow of air behind the end bag, such that a film of air is established between the end bag and the backing plate. As we have suggested, this film of air has the unexpected property of establishing a venturi like action which keeps the end bag spaced from the tunnel plate as the bag is fed into the tunnel.

Once the end bag is in the tunnel a second source of air, this one an air knife above the path of travel, directs a burst of air through the preformed opening of the end bag to expand the bag for receipt of a product. Since the tunnel has a small thickness dimension the bag opening is limited and a relatively large transverse dimension is maintained so the bag can receive a CD or other like shaped object. A CD is then dropped into the bag, a sealer pad is closed against the bag to clamp it against a seal bar and effect a seal of the now loaded end bag. Concurrently with the seal formation, the bagging machine reverses the web feed to separate the now loaded end bag from the web. Once the seal pad is opened the now finished CD package is dropped onto a conveyor or into a suitable receiving receptacle.

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Accordingly, the objects of the invention are to provide a packaging machine with a novel and improved load station delineating structure and a method of loading thin products, such as CD's into bags to form packages.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view in somewhat schematic form of the machine of the Excel Patent with the CD dispenser of the Dispenser Patent mounted atop it;

FIG. 2 is an enlarged partially sectioned and partially side elevational view of feed and sealer portions of the bagger and of the novel and improved guide and tunnel arrangement of this invention;

FIG. 3 is a front elevational view on an enlarged scale with respect to FIG. 1 and a reduced scale with respect to FIG. 2 of the bag dispensing portion of the bagger equipped with the guide and tunnel mechanism of the present invention;

FIG. 4 is an exploded perspective view of the support, guide and tunnel plates of the present invention; and,

FIG. 5 is a sectional view of the air guide as seen from the plane indicated by the line 5—5 of FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings and FIG. 1 in particular, the machine of the Excel Patent is shown somewhat schematically at 10. The mechanism of the Dispenser Patent 12 is mounted atop the bagging machine 10. The machine 10 includes a bagger 14 supported by a frame 15. A chain of interconnected, preopened bags (not shown) is fed from a supply station 16 to the bagger and thence to a packaging station shown generally at 18. The operation of the bagger is described in the Excel Patent and accordingly will not be repeated here.

The CD dispenser 12 includes a turret 20 which supports a plurality of mandrels 22. The mandrels 22 each support a different stack of CD's shown in dotted lines of 24. The construction and operation of the CD dispenser is described fully in the Dispenser Patent and accordingly the details of it are not repeated here.

The dispenser 12 includes a pair of pickup and dispensing arms 25 which are supported by a rotatable boss 26. The upper one of the arms 25 as viewed in FIG. 1 functions to pickup CD's sequentially and one at a time from a positioned stack of CD's 24. Upon 180° rotation of the boss 26, the picked up disc is transferred to a dispensing position as shown by the lower one of the arms 25 in FIG. 1 and 2.

Referring now to FIG. 2, a web of preopened and interconnected bags 28 is fed by a pair of belts 30 to an outlet pair of nip rolls 32. As the web exits the nip rolls, it drops under the influence of gravity into the load station 18 until an end one of the bags 34 is positioned within a tunnel 35.

The load station includes a seal mechanism shown generally at 36 which is above the tunnel 35. The seal mechanism includes a reciprocally mounted sealer pad 38, a sealer bar 40 and a spring mounted bar protector plate 42. The protector plate 42 includes an air guide chamber 44 connected via an inlet 451 to a source of air under pressure, not shown. The chamber 44 is substantially enclosed by a cover plate 44-P. FIG. 3. An elongate thin slot portion is milled from the protector plate 42 to leave an elongate thin frontal outlet 45-0 between the plates 42, 44-P for emitting a stream of air as the web 28 is advanced to position an end bag 34 in the tunnel 35. As is best seen in FIG. 5, the slot portion

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has a radiused portion 43. Escaping air flow follows the radius in a wing foil like action such that a relatively wide flow of escaping air under pressure flows downwardly behind the bag web 28.

The flow of air from the chamber 44 establishes a film of air between the end bag 34 and a backing plate 46. FIGS. 2 and 4. The backing plate 46 is suitably connected as by clamps 48 to a pair of support rods 50. The rods 50 are connected and project from the bagger 14 as best seen in FIG. 2. The front of the tunnel 35 is delineated by a tunnel plate 52 secured to the backing plate 46 by fasteners, not shown, which project through fastener apertures 54. FIG. 4. Thus, the backing and tunnel plates 46, 52 have internal walls which define the tunnel 35.

A support plate 56 is mounted on a face of the bagger 14 above the path of web travel. FIGS. 2 and 3. The support plate 56 is a standard component of the machine of the Excel Patent modified to provide the improved system of the present invention. Specifically, as best seen in FIG. 4, an arcuate cut-out 58 is provided in order that a disc 60 when dispensed from the lower of the pickup arms 25 will not be interfered with by the support plate.

The support plate 56 is further modified to provide a pair of threaded apertures 62. A guide plate 64 is provided. The guide plate has an upper mounting part or tab 65 including a spaced pair of apertures 66. Fasteners, not shown, extend from behind the guide plate 64 through the apertures 66 and threadedly engage the threaded apertures 62 to secure the guide plate 64 to the support plate 56.

As best seen in FIGS. 3 and 4, the guide plate 64 includes a central connecting part 68 which extends downwardly and outwardly at an obtuse angle with respect to the mounting part 65 as measured in an imaginary plane vertically bisecting the mounting part. The guide plate 64 also includes a spaced pair of side guide arms 70 which project downwardly and outwardly at obtuse angles with respect to the connecting part 68 as measured in a second imaginary plane orthogonal to the bisecting plane. The guide plate has flaring parts 72 which flare forwardly and outwardly from the connecting part 68 and interconnect the guide arms 70 with the connecting part.

As is best seen in FIGS. 2 and 4, the tunnel plate 52 includes a spaced pair of mounting tabs 74 which include the fastener apertures 54. The tunnel plate has a central portion 75 spaced forwardly from the mounting tabs 74 and connected to them by a spaced pair of flaring portions 76. The tunnel plate 52 also includes a guide flange 78 which extends upwardly and outwardly from the central portion 75. The guide flange 78 functions to assure that an end bag 34 is guided into the tunnel 35 as it is fed downwardly and assure that the top of the bag flares outwardly when it is opened. Similarly, the guide flange 78 functions to assure that a dropped lower disc 60 is cammed into and enters the positioned and opened end bag 34.

OPERATION

First, the set up procedures described in connection with the bagging machine 10 in the Excel Patent and the dispenser 12 in the Dispenser Patent, are performed. Assuming both the machine and the dispenser 10, 12 are ready for operation, the bagger 14 is energized to feed the web outwardly and downwardly until the end bag 34 is positioned in the tunnel 35. As the web is fed to position the end bag, air under pressure is supplied to the air guide chamber 44 and air exiting the outlet 45 flows downwardly along the web to establish an air film between the end bag 34 and the

tunnel wall of the backing plate 46. Concurrently, with a venturi like effect, this flow of air causes the front of the end bag 34 to stay sufficiently clear of the tunnel wall of the central portion 75 to allow the bag to fall readily and freely into the tunnel 35.

Once the end bag 34 is located at the load station 18, the supply of pressurized air to the chamber 44 is terminated and air under pressure is supplied to an air knife 80 to open the end bag 34 expanding the bag against the walls defining the tunnel and the top of the bag against the guide flange 78.

The disc 60 is now released from the arm 25 by terminating the vacuum drawn from tips 82, FIG. 2, and supplying a puff of air to cause the disc 60 to be released, all as described in greater detail in the Dispenser Patent. Should the disc 60 engage the guide plate only peripheral edges outboard of the delicate face will engage the forwardly and downwardly slanting guide arms 70. The disc 60 will then, under the gravitational influence, drop into the open end bag. If the disc is slightly forward relative to the bagger 14 of an appropriate path for descent into the opened bag 34, the guide flange 78 will function to guide the disc into the open bag. Any engagement will be with the perimeter or perhaps a marginal portion of the back of the disc opposite the delicate face of the disc which is directed toward the bagger.

Once the disc 60 is positioned within the bag 34, the flow of air from the air knife is terminated. The end bag 34 is sealed and the web feed belts 30 are driven in the reverse direction to separate the web from the end bag 34 all as described in greater detail in the Excel Patent.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction, operation and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim:

1. A method of packaging thin products utilizing a chain of interconnected preopened bags comprising:

- a) feeding an end bag of the chain closed end first into an elongate, loading station delineating, tunnel;
- b) as the end bag is being fed into the tunnel to position the end bag in the station establishing a flowing film of air between a back of the end bag and a back of the tunnel;
- c) continuing the flow of air in the film of air to maintain the back of the end bag and tunnel in spaced relationship and concurrently provide clearance between fronts of the bag and tunnel;
- d) opening the end bag sufficiently to enable insertion of a product as the bag is positioned in the station; and,
- e) inserting a thin product into the opened end bag.

2. The method of claim 1 further including the step of separating the end bag from the web.

3. The method of claim 2 wherein the end bag is closed and sealed as it is separated from the web.

4. The method of claim 1 wherein the step of inserting the product comprises a gravity feed of the product.

5. The method of claim 1 wherein the product is a compact disc.

6. The method of claim 1 wherein the flow of film forming air is terminated before the bag is opened.

7. The method of claim 6 wherein the bag is opened by a blast of air from a source other than the source of the flowing film.

8. The method of claim 1 wherein the bag is opened by a blast of air from a source other than the source of the flowing film.

9. The method of claim 1 wherein the flow of air for the film is supplied by an air guide having an elongate air outlet opening oriented transversely of the path of bag feeding.

10. In a packaging machine of the type wherein end bags of a chain of preopened interconnected bags are sequentially positioned in and loaded at a load station, the improvement comprising:

- a) a frame structure;
- b) a web feed connected to the structure for feeding such a chain along a path of travel to the load station;
- c) a tubular mechanism connected to the structure, the mechanism delineating an elongate thin tunnel sized to be only slightly thicker than a bag at the load station with a product being packaged in the bag; and,
- d) a source of flowing air positioned behind the path of travel and oriented to direct a film of air into the tunnel and create a lubricating film of air between a back of the tunnel and the web as an end bag is fed into loading position in the load station.

11. The machine of claim 10 wherein the web feed is reversible for separating end ones of such chain from the chain.

12. The machine of claim 10 wherein the air source is an air guide having a thin, elongate outlet defined in part by a radius at an outer end of the outlet.

13. The machine of claim 10 wherein a second air source is provided for opening bags positioned in the tunnel.

14. The machine of claim 10 wherein the source of air is also positioned to provide an air flow which draws the bag away from a front of the tunnel.

15. The machine of claim 10 further including a guide plate above the tunnel for guiding a gravity deposited product into an opened bag located in the tunnel.

16. A method of loading products sequentially into bags of a chain of interconnected preopened bags fed sequentially and one at a time into a load station within an open ended tunnel having front and back faces comprising:

- a) sequentially feeding bags one at a time into the load station;
- b) as each bag is being fed into the tunnel to the load station maintaining the bag substantially free of contact with the faces of the tunnel by flowing air between the bag and one of the faces to establish an air film between the bag and the one face while concurrently maintaining the bag spaced from the other face;
- c) sequentially loading products into the bags as they are sequentially positioned in the load station; and,
- d) removing loaded bags from the station.

17. The process of claim 16 wherein the bags are fed by and from a bagging machine along a path of travel and wherein said one face is defined by a machine part behind the path.

18. The process of claim 17 wherein the flow of air for the film is supplied by an air guide having an elongate air outlet opening oriented transversely of the path of bag feeding.

19. The process of claim 16 wherein the flow of air for the film is supplied by an air guide having an elongate air outlet opening oriented transversely of the path of bag feeding.

20. In a packaging machine of the type wherein end bags of a chain of preopened interconnected bags are sequentially positioned in and loaded at a load station, the improvement comprising:

- a) a frame structure;

- b) a web feed connected to the structure for feeding such a chain along a path of travel to the load station;
 - c) a tubular mechanism connected to the structure, the mechanism delineating an elongate thin tunnel sized to be only slightly thicker than a bag at the load station with a product being packaged in the bag;
 - d) the web feed being for feeding end ones of the bags to a load station and being reversible for separating end ones of such chain from the chain; and,
 - e) an air guide flowing air positioned behind the path of travel and oriented to direct a film of air into the tunnel and create a lubricating film of air between a back of the tunnel and the web as an end bag is fed into loading position in the load station.
21. The machine of claim 20 wherein a second air source is provided for opening bags positioned in the tunnel.
22. The machine of claim 20 wherein the air guide is also positioned to provide an air flow which draws the bag away from a front of the tunnel.
23. The machine of claim 20 further including a guide plate above the tunnel for guiding a gravity deposited product into an opened bag located in the tunnel.
24. The machine of claim 20 wherein the air guide has a thin, elongate outlet defined in part by a radius at an outer end of the outlet.
25. In a bagger for sequentially packaging products in sequential end bags of a flattened web of interconnected and preopened bags, an improved product guide and load station delineating mechanism comprising;
- a) a support plate mounted above a path of web travel to the load station;
 - b) a guide plate secured to and depending from the support plate;

- c) a backing plate connected to the remainder of the bagger and positioned along a section of the web path of travel below a web exit from within the bagger;
 - d) a tunnel plate secured to the backing plate;
 - e) the backing and tunnel plates each having a central portion wall, the walls being spaced and defining a tunnel of a thickness slightly larger than the thickness of an end bag containing a product as such bag and product are being made into a package.
26. The mechanism of claim 25 further including an air guide for emitting a flow of air to form an air film in the tunnel between a back of an end bag in the tunnel and a back one of the walls while maintaining a front of such end bag substantially free of contact with a front one of the tunnel walls.
27. The mechanism of claim 25 wherein the guide plate includes a mounting tab and a depending central portion angled outwardly from the mounting tab at an obtuse angle as measured in an imaginary, vertically bisecting plane.
28. The mechanism of claim 27 wherein the guide plate further includes spaced side guide portions connected to the central portion by spaced flaring sections, the guide portions being at equal and opposite obtuse angles with the central portions as measured in a second imaginary plane which is a orthogonal to the bisecting plane.
29. The mechanism of claim 25 wherein the tunnel plate includes a central portion, a pair of spaced connecting portions flaring from opposite sides of the central portion and a spaced pair of mounting tabs respectively connected to the connecting portions.
30. The mechanism of claim 29 wherein the tabs are in a common plane spaced from a plane generated by the central portion.

* * * * *

Detailed Description Text - DETX (7):

Mounted on the upper end of the bolt 74 is a floor 78 formed with a plurality of openings 79 disposed circumferentially near the outer edge of the floor. The openings 79 allow air to pass from the interior of the spherical shell 24 through to the opening 70 and then out the opening to the pump 80 as will next be discussed. The floor 78 and opening 79 allow a balloon to expand thereagainst while still allowing air to flow through the openings to escape the interior of the spherical shell 24 when the spherical shell is coupled to the pump 80.

Current US Origin



US 20020065126A1

(19) **United States**(12) **Patent Application Publication**

Miller et al.

(10) Pub. No.: **US 2002/0065126 A1**(43) Pub. Date: **May 30, 2002**(54) **METHOD, APPARATUS AND SYSTEM FOR GAMING USING A ROTATABLE PAYOUT INDICATOR**(76) Inventors: **Charles R. Miller**, Henderson, NV (US); **Brian A. Johnson**, Las Vegas, NV (US); **James R. Stanek**, Henderson, NV (US); **Canyon Deville**, Henderson, NV (US); **Michael MacVittie**, Las Vegas, NV (US); **William R. Adams**, Las Vegas, NV (US)

Correspondence Address:

TRASK BRITT**P.O. BOX 2550****SALT LAKE CITY, UT 84110 (US)**(21) Appl. No.: **09/966,333**(22) Filed: **Sep. 27, 2001****Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/676,612, filed on Sep. 29, 2000, which is a continuation of application No. 09/157,997, filed on Sep. 22, 1998,

now abandoned, which is a continuation-in-part of application No. 08/907,764, filed on Aug. 8, 1997, now patented, which is a continuation-in-part of application No. 08/311,783, filed on Sep. 23, 1994, now abandoned.

Publication Classification(51) Int. Cl.⁷ **A63F 9/24**(52) U.S. Cl. **463/20**(57) **ABSTRACT**

Gaming devices comprising a gaming unit configured for play of a primary game and a bonus game. The bonus game portion of the gaming unit includes at least a outcome display element with an associated, cooperative outcome indicator element. The outcome display element may be rotatable about a substantially upright axis and comprise a sphere, a gem or other suitable element for displaying potential game outcomes for the bonus game, the game outcome being indicated by a portion of the outcome display element aligned with the outcome indicator element upon cessation of rotation of the former. Employing visually perceptible representations of rotation of the outcome display element rather than physical rotation thereof is also disclosed.

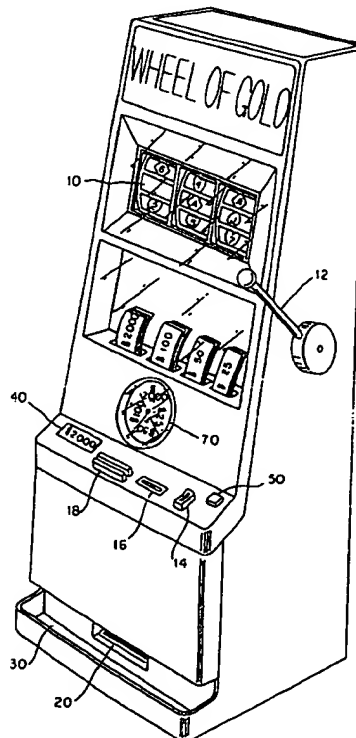


FIG. 1

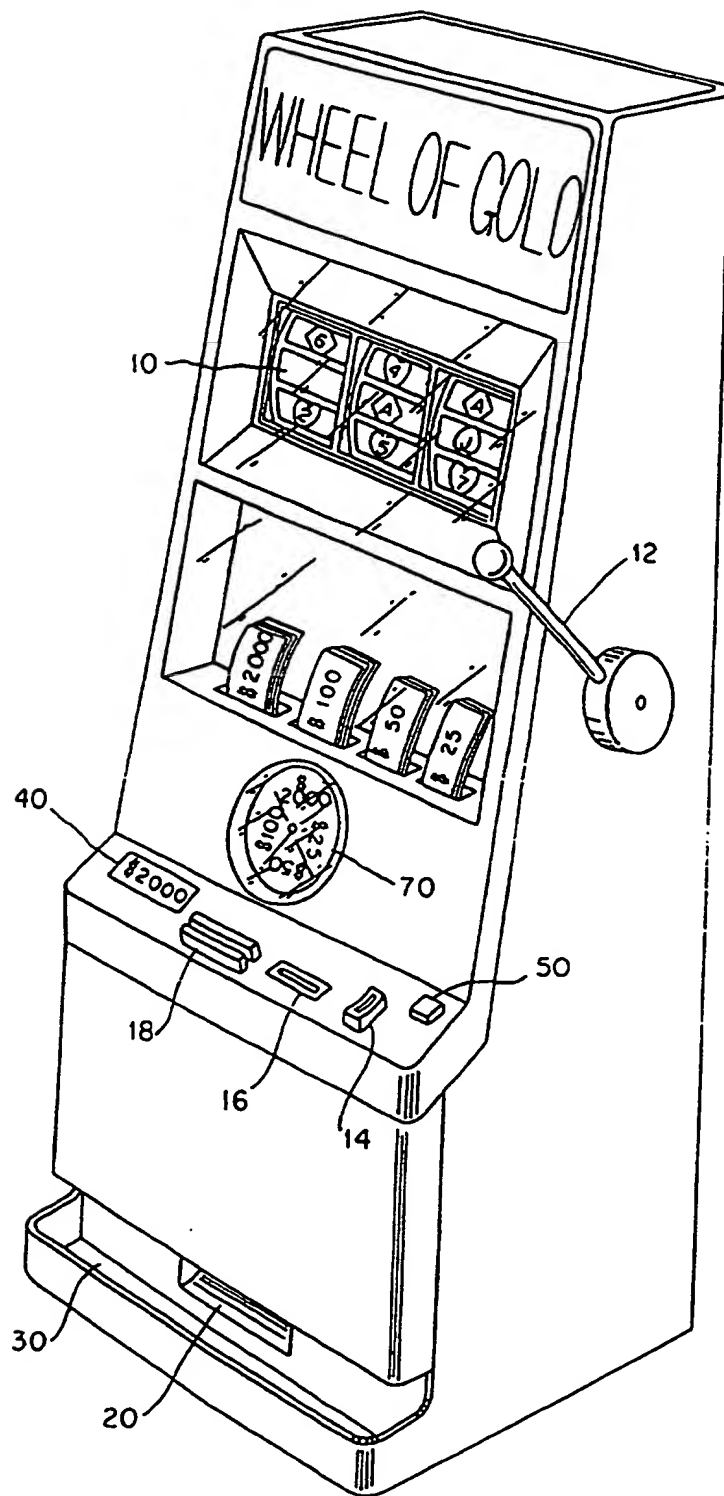


FIG. 2

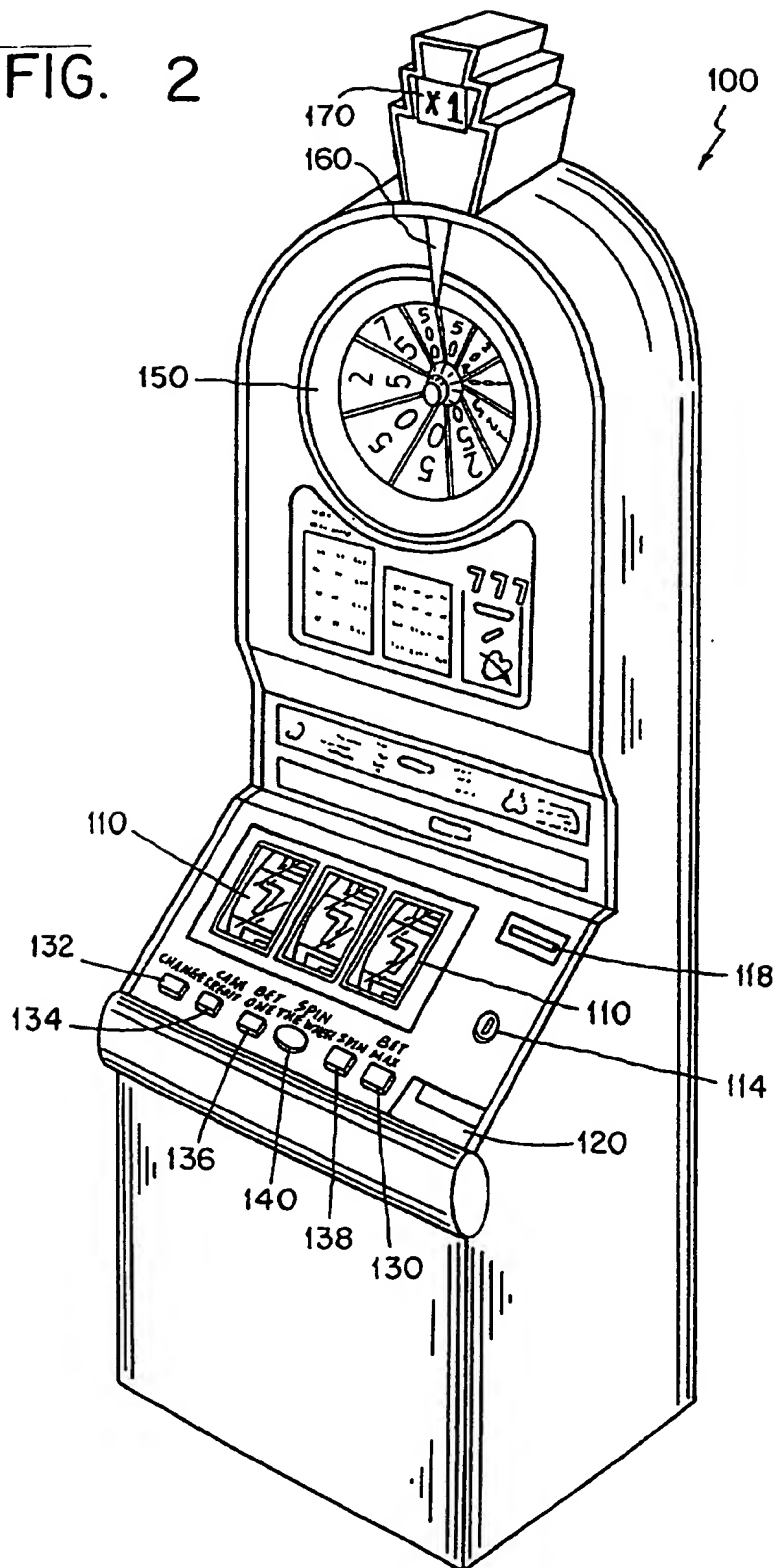


FIG. 3

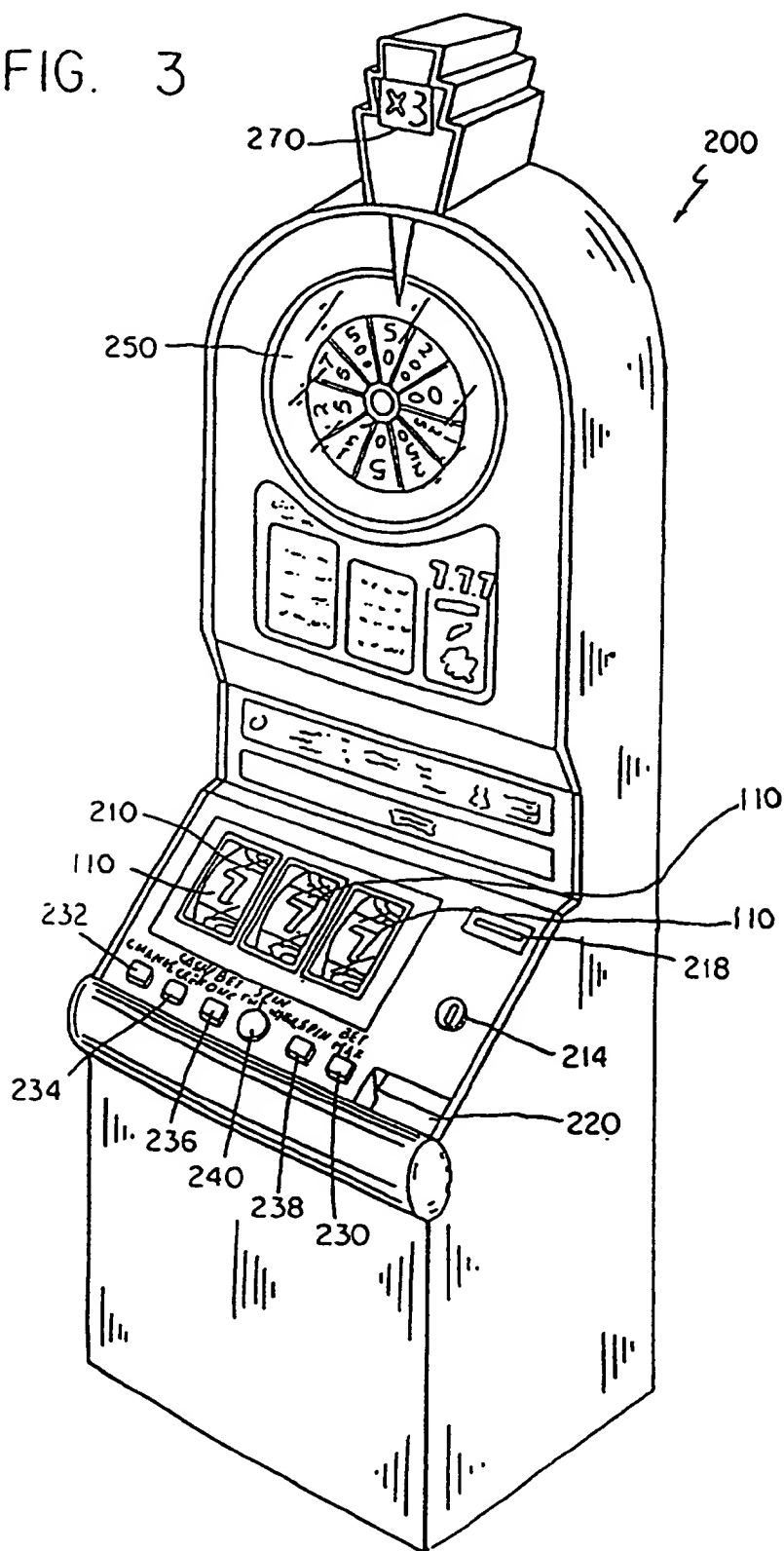
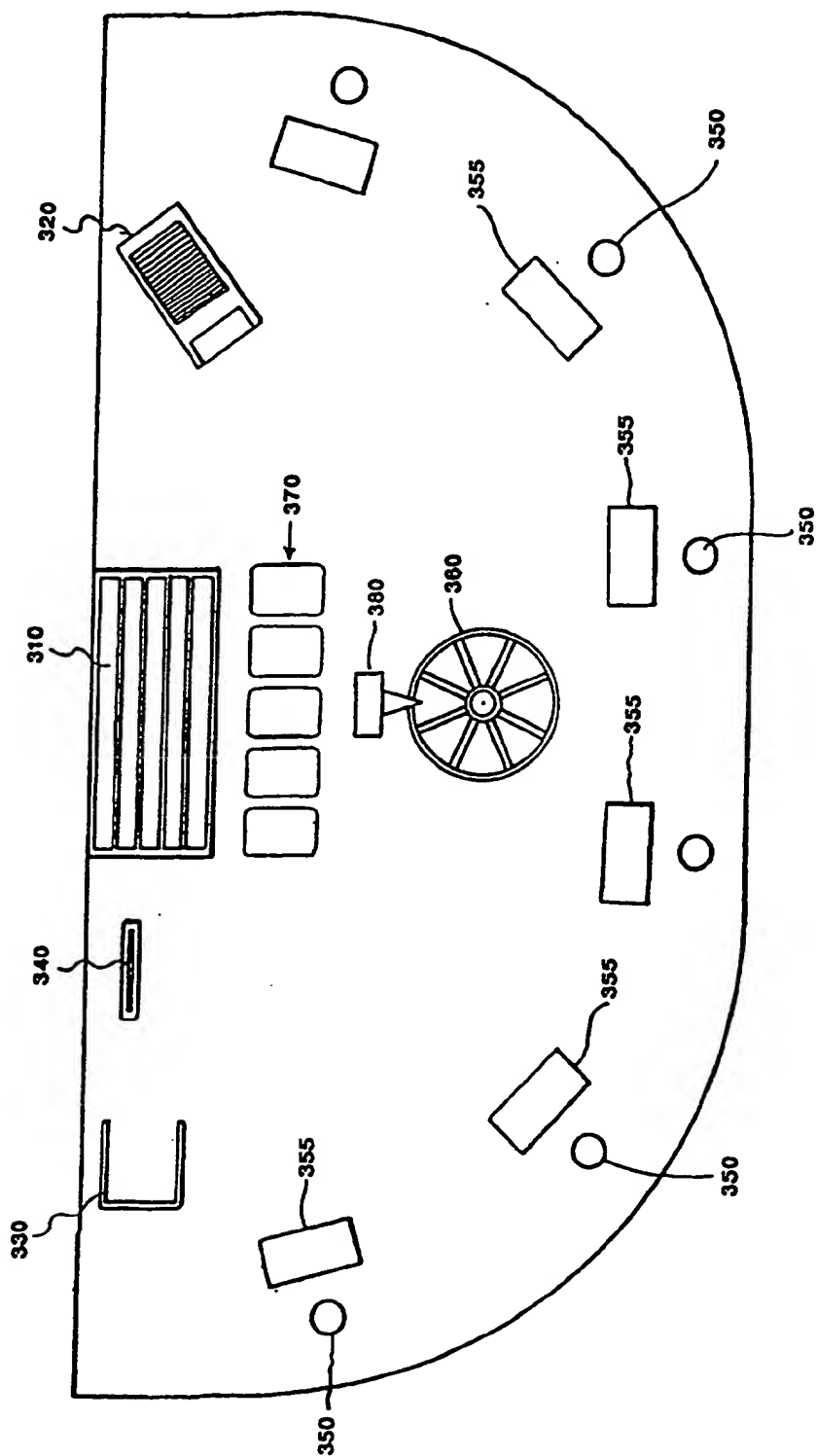


FIG. 4



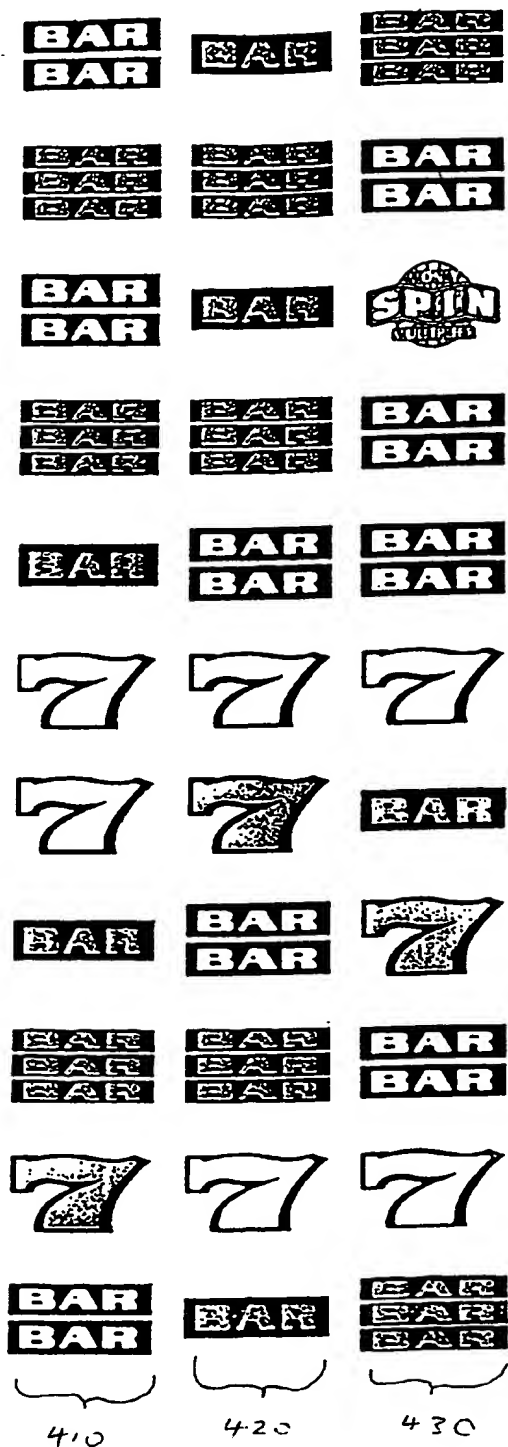


FIG. 5

FIG. 6

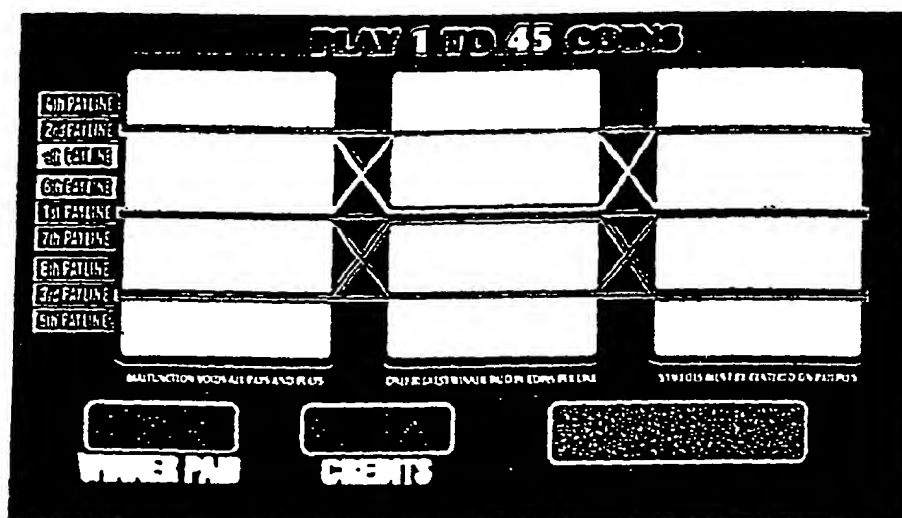
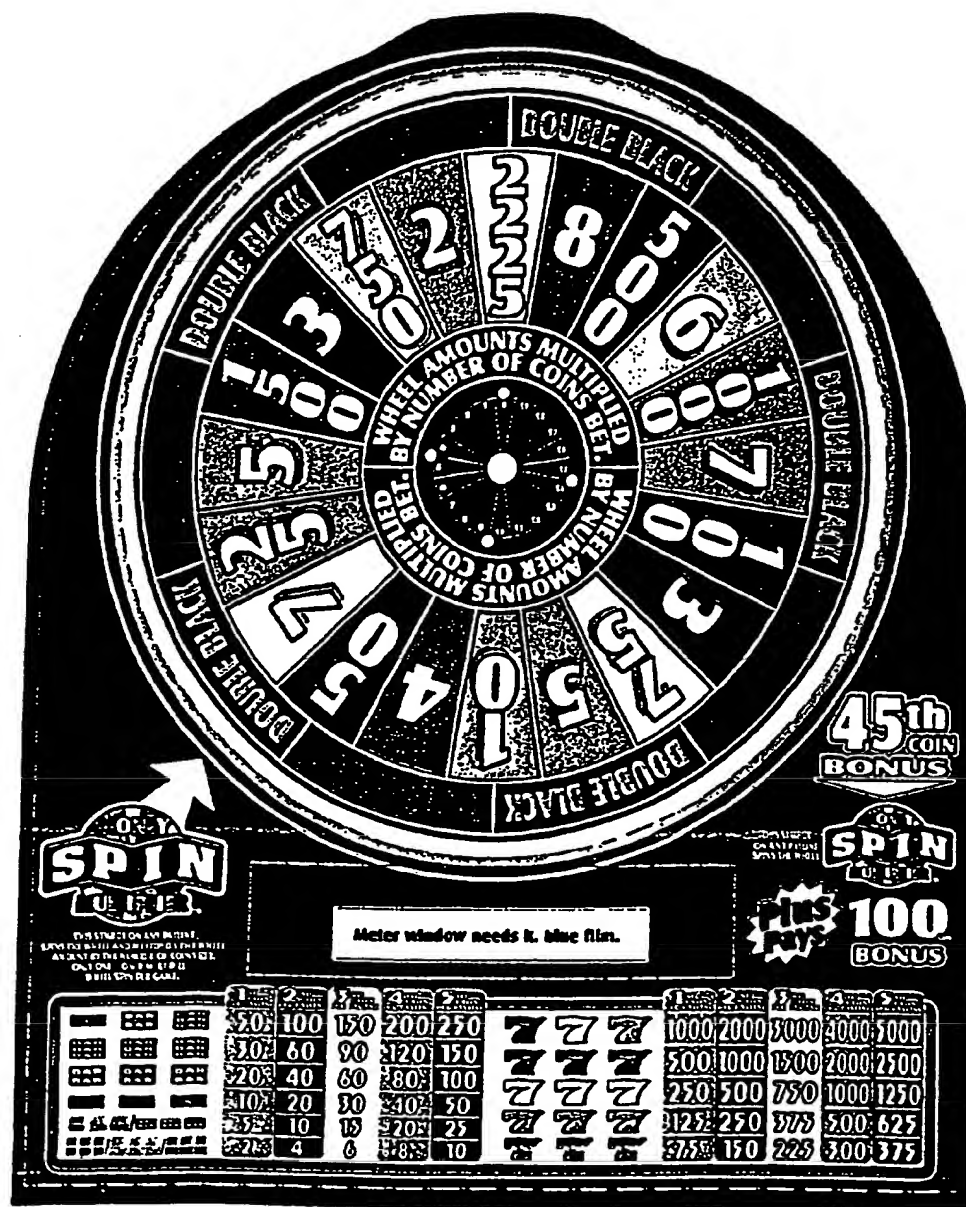


FIG. 7



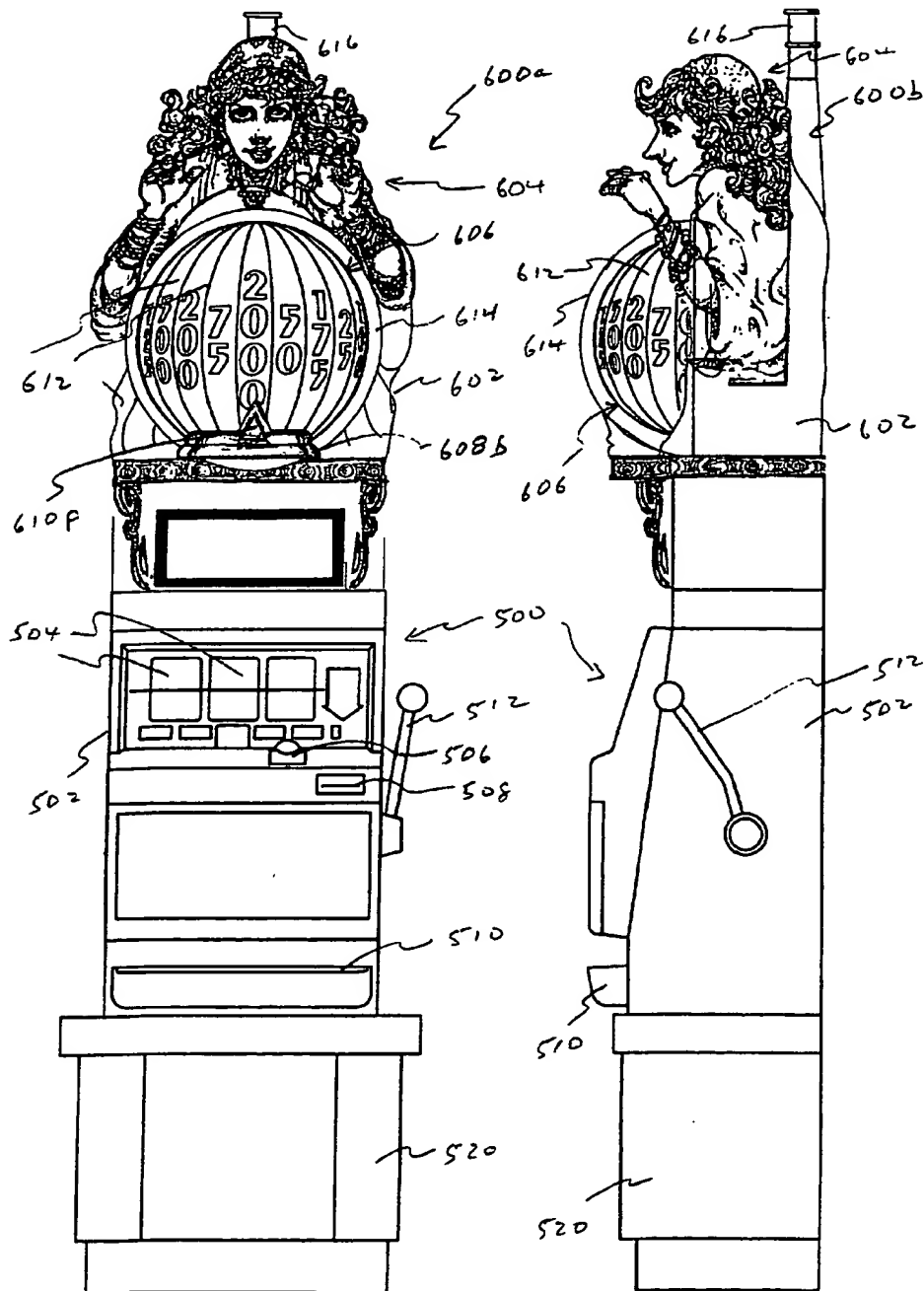


FIG. 8A

FIG. 8B

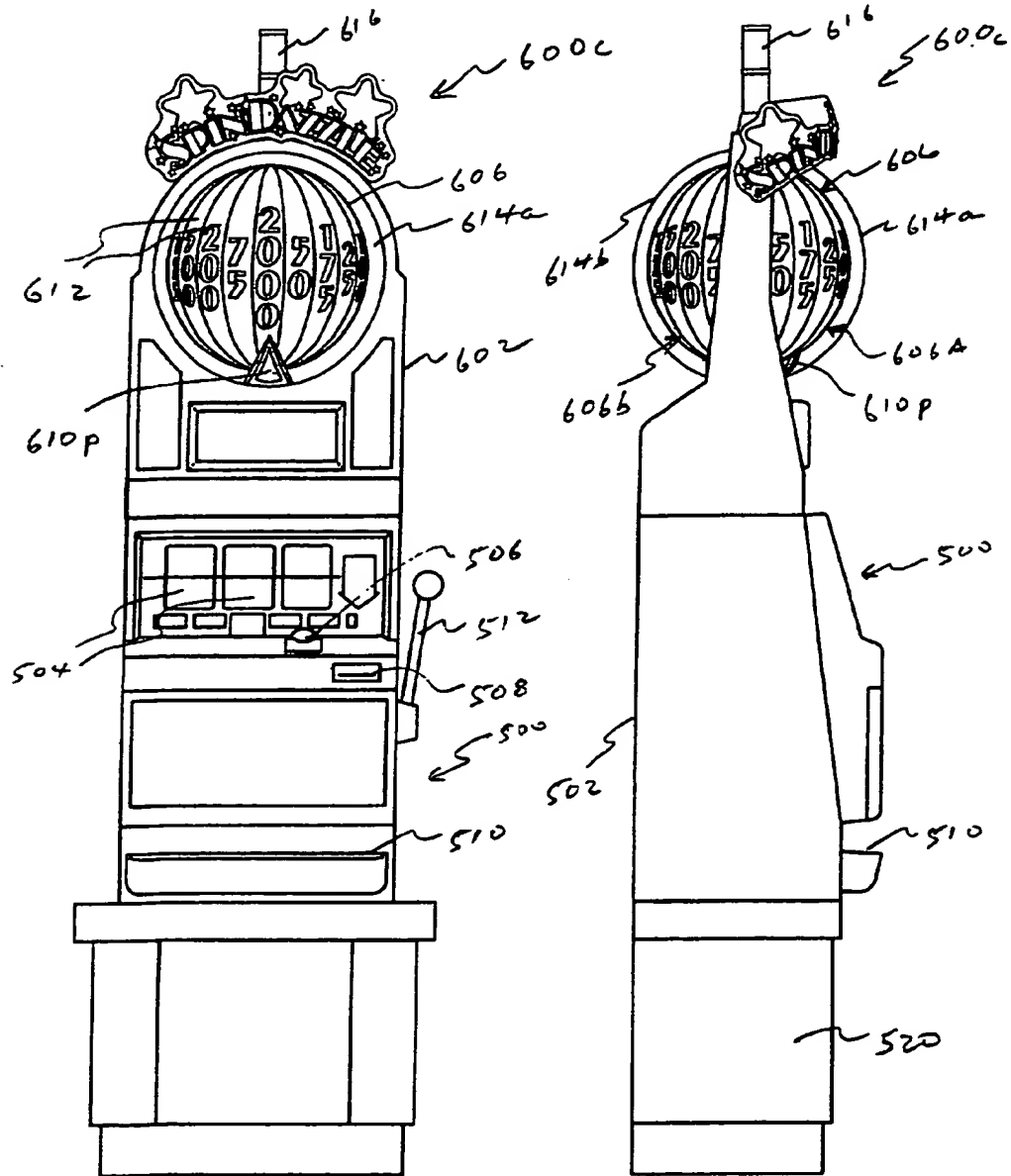
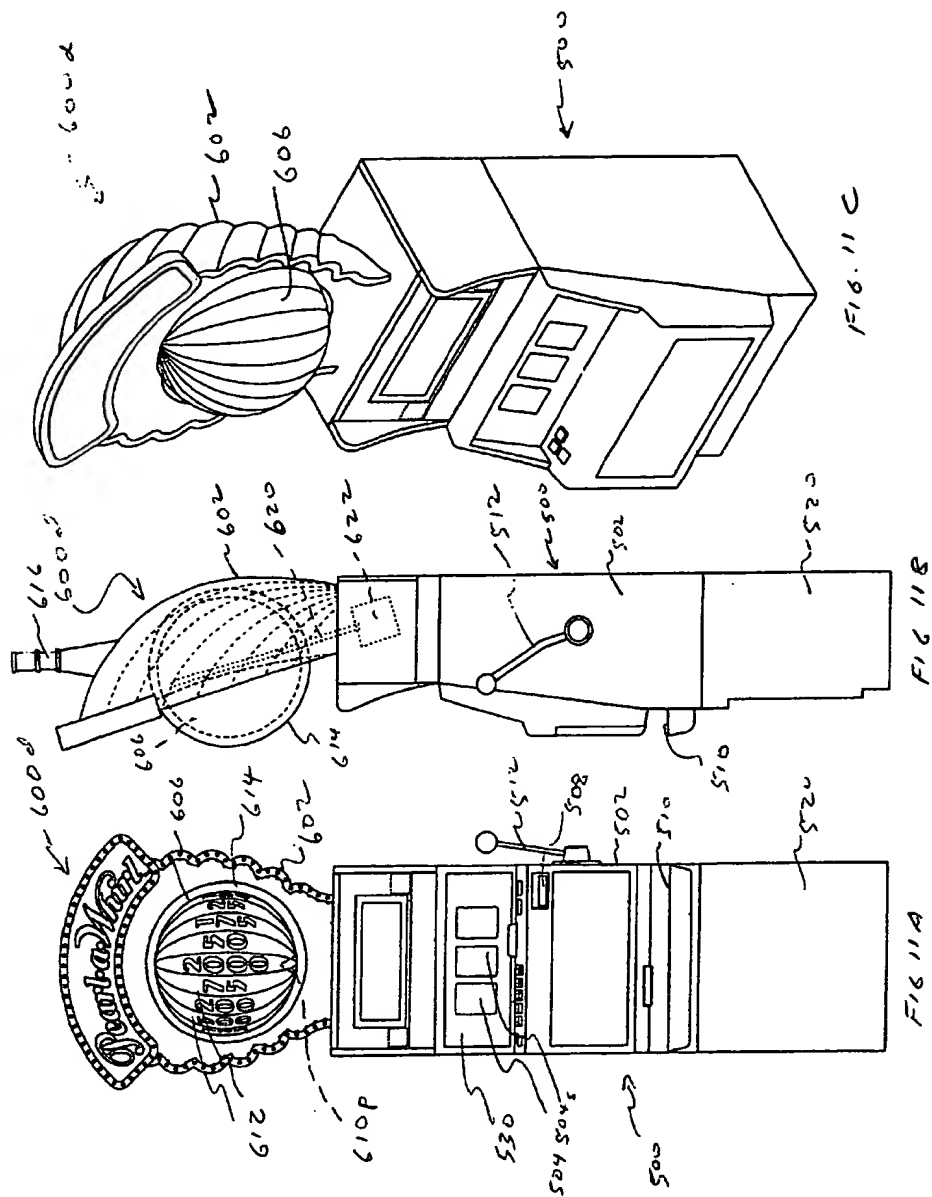
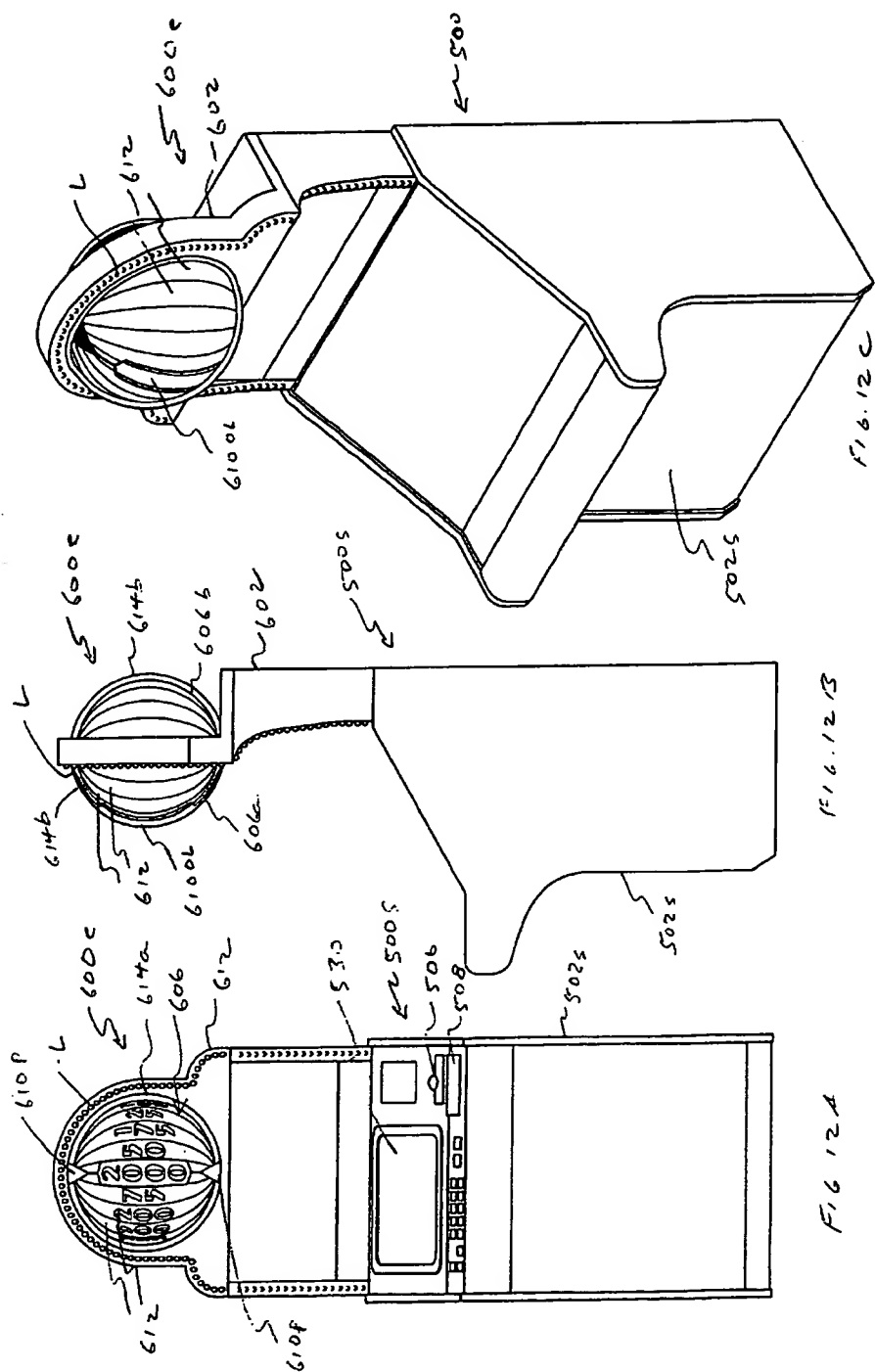


FIG. 10A

FIG. 10B





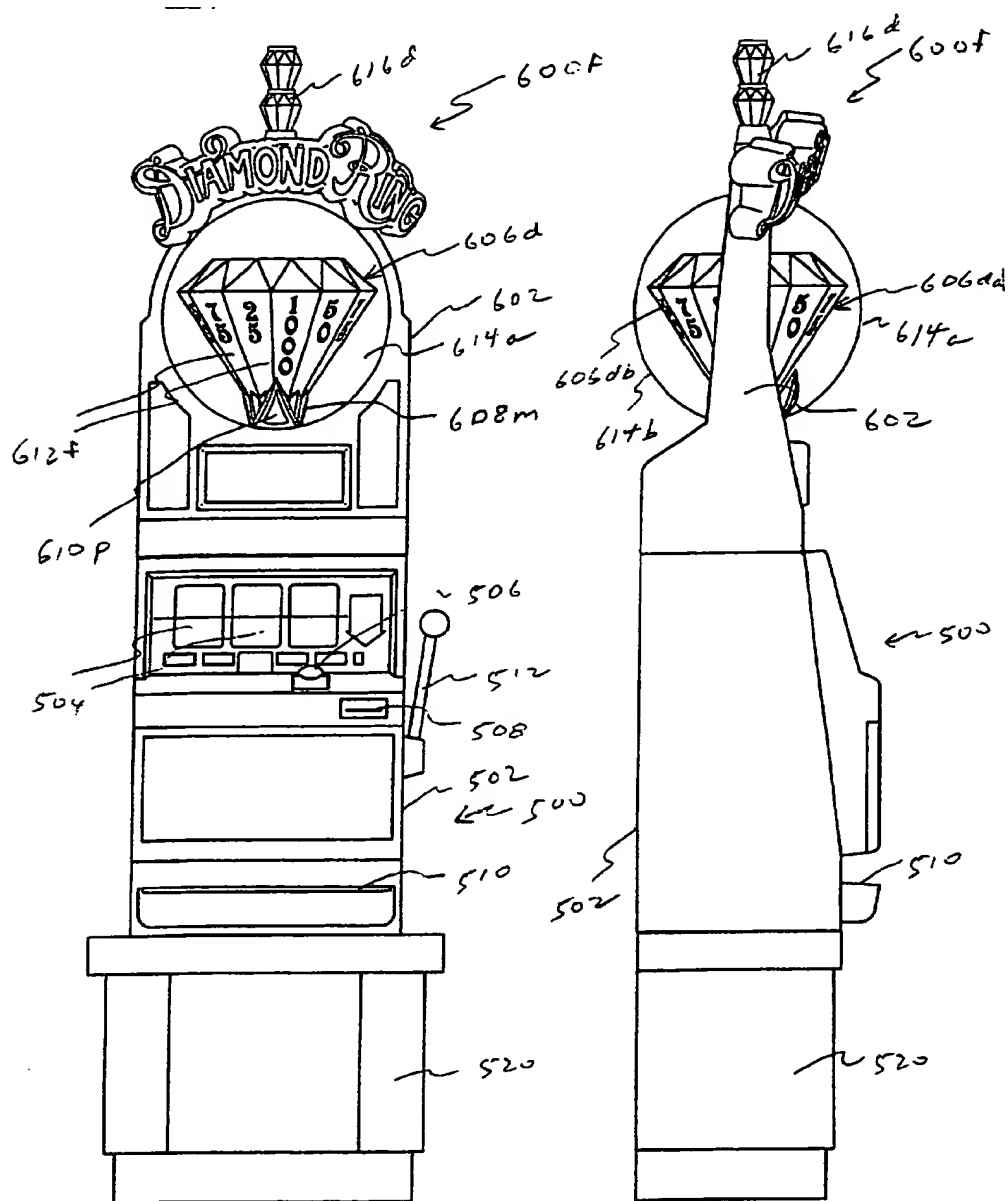


FIG. 13A

FIG. 13B

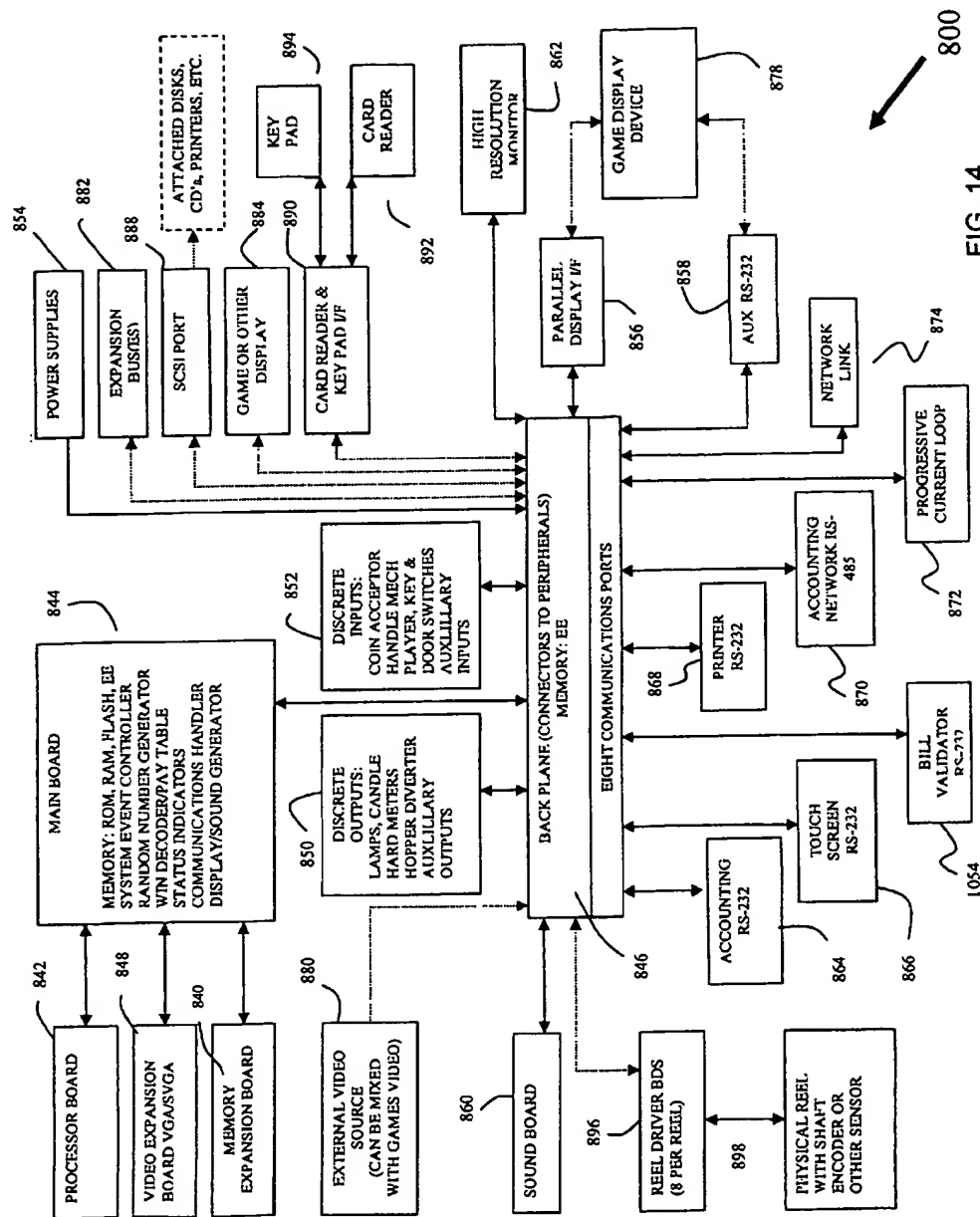


FIG. 14

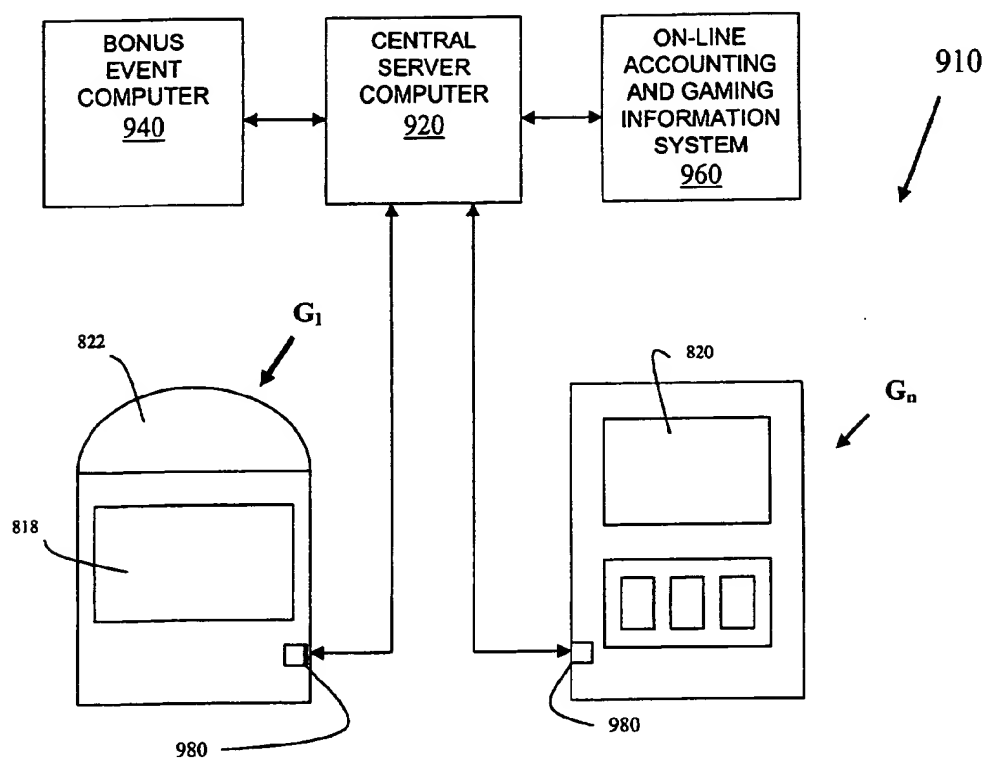


FIG.15

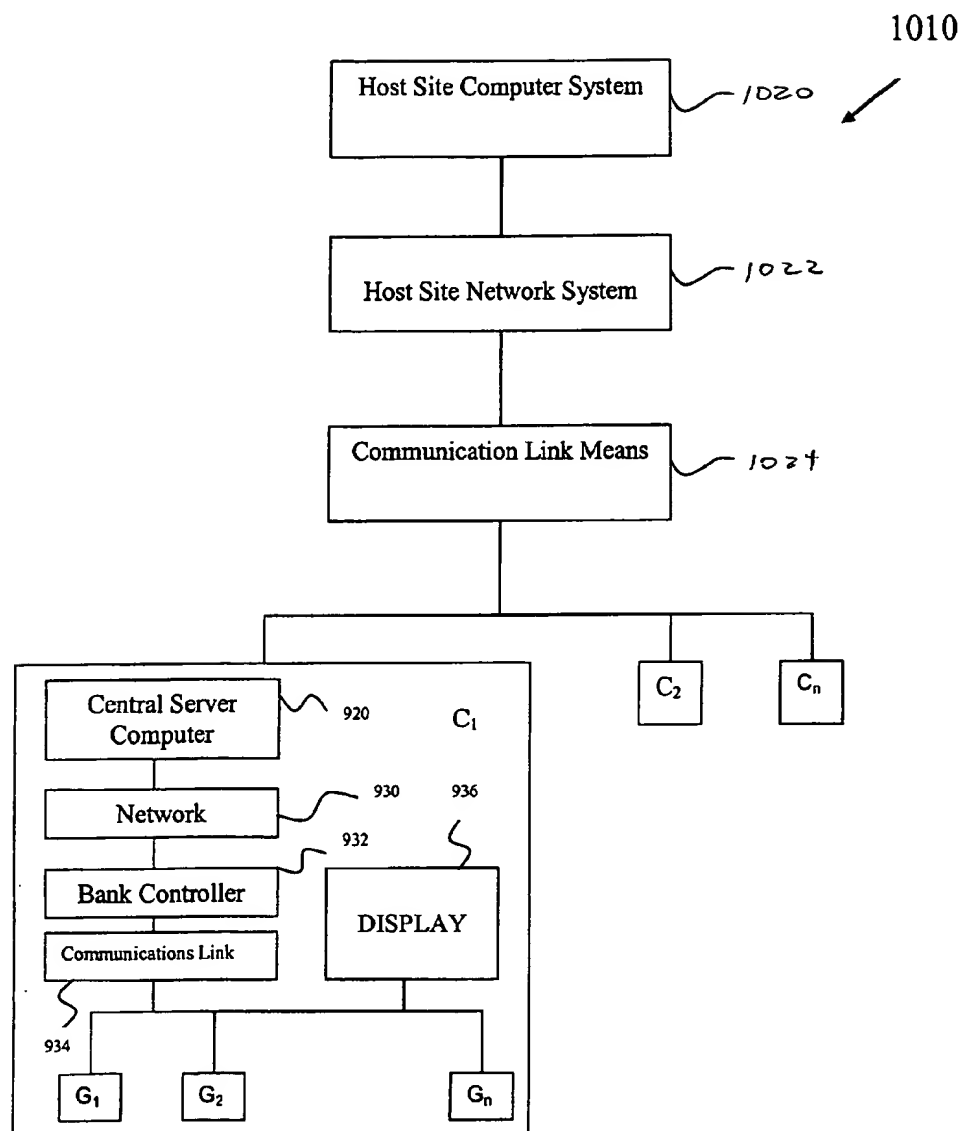


FIG 16

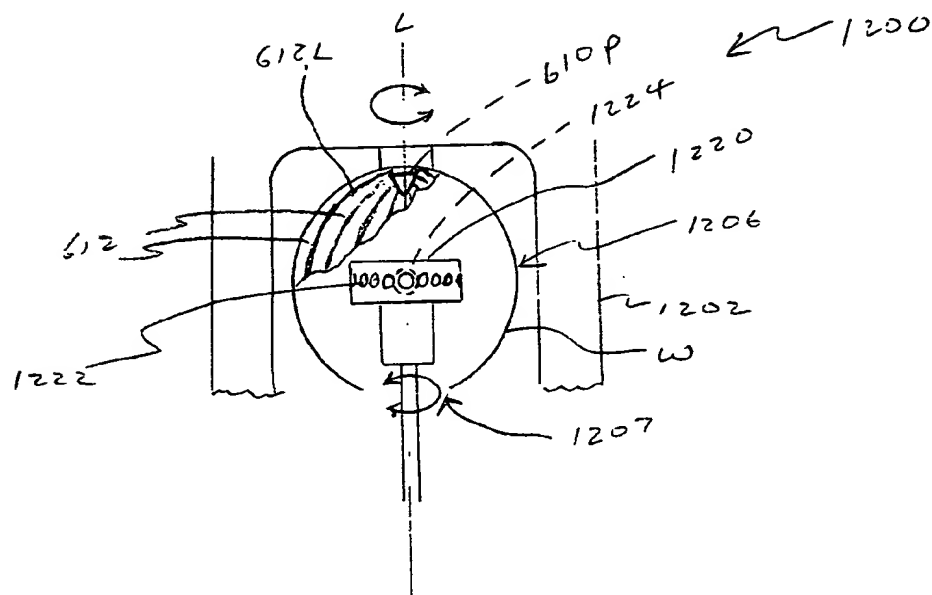


FIG. 17

METHOD, APPARATUS AND SYSTEM FOR GAMING USING A ROTATABLE PAYOUT INDICATOR

RELATED APPLICATION DATA

[0001] This application is a continuation-in-part of copending U.S. patent application Ser. No. 09/676,612 filed on Sep. 29, 2000, which is a continuation of U.S. patent application Ser. No. 09/157,997 filed on Sep. 22, 1998, now abandoned, which is a continuation-in-part of U.S. patent application Ser. No. 08/907,764 filed on Aug. 8, 1997, now U.S. Pat. No. 5,848,932, which is a continuation-in-part of U.S. patent application Ser. No. 08/311,783 filed on Sep. 23, 1994, now abandoned.

BACKGROUND OF THE INVENTION

[0002] The present invention is directed to novel gaming devices and, more particularly, to gaming devices comprising at least primary and secondary events capable of providing at least one of a plurality of payouts. More specifically, the present invention relates to gaming methods, devices and systems employing a rotating sphere or other element to display an outcome of a game of chance.

[0003] Games of chance have been enjoyed by people for years and have enjoyed widespread popularity in recent times. Many people enjoy playing a wide variety of games that they have not played before. Playing new games adds to the excitement of this recreational activity particularly when some form of "gaming" is involved. As used herein, the terms "gaming" and "gaming devices" are used to indicate that some form of wagering is involved, and that players must make wagers of value, whether actual currency or some equivalent of value, e.g., token or credit.

[0004] One popular game of chance that has long been enjoyed by many players is the slot machine. Conventionally, a slot machine is configured for a player to input something of value, e.g., a standard denomination of currency or house token or other representation of currency or credit, and then to permit the player to activate the device, which causes a plurality of reels to spin and ultimately stop to display a random combination of some form of indicia, for example, numbers or symbols. If this display contains one of a preselected plurality of winning combinations, the machine releases money into a payout chute or onto a credit meter for the player. For example, if a player initially wagered two coins of a national currency and that player won a high payout, that player may receive fifty coins of the same denomination in return.

[0005] Electronic games and their methods and apparatus for use are well-known in the art. Electronic games include games of chance, games of skill, and games involving both skill and chance. Examples of patents describing various games of chance include U.S. Pat. No. 5,833,536 to Davids et al. (Nov. 10, 1998), U.S. Pat. No. 5,769,716 to Saffari et al. (Jun. 23, 1998), U.S. Pat. No. 5,820,460 to Fulton (Oct. 13, 1998) and U.S. Pat. No. 5,947,820 to Morro et al. (Sep. 7, 1999).

[0006] Electronic games may also be coupled to one or more other computers such as a central controller of a casino, e.g., via a network card and link, modem and the like. The game parameters, such as how, when and where

particular images will appear on the display screen, how the game works and how to operate the various elements operably coupled to the computer, are stored in the memory. Often, the electronic gaming device may be housed in a structural and/or decorative housing as is well-known and understood by those of ordinary skill in the art.

[0007] As noted above, initiating an electronic game can be done as simply as by inserting a coin, token, or other type of currency. Another more comprehensive example of initiating a game includes inserting an identification card, such as a "smart card" having a programmed microchip or a magnetic strip coded with a player's identification, credit totals and other relevant information. See U.S. Pat. No. 5,265,874 to Dickinson et al. (Nov. 30, 1993), the disclosure of which is hereby incorporated by reference herein. It is also known to use a writeable identification card, such as a smart card to eliminate the need for a network or direct connection between remote systems and a common controller or point database such as is described in U.S. Pat. No. 5,806,045 to Biorge et al. (Sep. 8, 1998). Promotional point and credit information may be retrieved, recorded and updated using the smart card. Additionally, it is known to transfer money to a game through an electronic funds transfer as described in U.S. Pat. No. 5,902,983 to Crevelt et al. (May 11, 1999).

[0008] Existing electronic game displays typically include multiple images representing various aspects of a game such as a game portion, a credit total portion and a wager amount portion. Other electronic game displays include an additional bonus award portion to indicate an amount of a bonus award which may be won, typically through multiple or secondary games. See U.S. Pat. No. 5,851,148 to Brune et al. (Dec. 22, 1998) and U.S. Pat. No. 5,911,418 to Adams (Jun. 15, 1999).

[0009] Bonus gaming, also known in the art, includes employing a secondary game, often a different type of game than that of the primary game, as an additional activity for a player of the primary game. Implementation of a bonus game includes providing a game of chance, such as, for example, one like that described above, as a first or a primary gaming unit. Another gaming unit is then provided as a secondary, bonus game which is typically accessible upon receipt of a winning hand (in the case of a card game) or the occurrence of a specified symbol, icon, or indicia or one or more specific combinations of same during play of the primary gaming unit. Often the existence of a bonus game serves to attract a player through the perception of having increased opportunity to win during the player's gaming activities. The display associated with the bonus game is separate and distinct from the display associated with the primary gaming unit. Exemplary gaming machines which offer not only a primary gaming unit but secondary games of various types are disclosed in U.S. Pat. Nos. 5,823,874 and 5,848,932 to Adams, assigned to the assignee of the present invention.

[0010] Bonus gaming may also be conducted through a plurality of networked games such that the secondary gaming activity might involve a plurality of individuals who have been wagering at primary gaming units. Some examples of bonus gaming include U.S. Pat. No. 5,779,544 (Jul. 14, 1998), U.S. Pat. No. 5,664,998 (Sep. 9, 1997) and U.S. Pat. No. 5,560,603 (Oct. 1, 1996) all to Seelig et al.

More particularly, some examples of bonus gaming including a plurality of networked primary gaming machines include U.S. Pat. No. 6,146,273 to Olsen (Nov. 14, 2000), U.S. Pat. No. 6,012,982 to Piechowiak et al. (Jan. 11, 2000), and U.S. Pat. No. 5,876,284 to Acres et al. (Mar. 2, 1999).

[0011] As noted above, bonus games serve to entice the player to wager at a particular primary game with the hope of being rewarded through the potential of increased winnings. One of the entertaining features of bonus games, such as the notably successful "WHEEL OF FORTUNE" networked bonus games offered in casinos throughout a particular state, for example Nevada, is the visual aspect of the rotating, brightly lit bonus wheel signaling the potential for a large, even multi-million dollar payout from a bonus game win funded by wagers placed on all of the participating, networked gaming machines. Further, those familiar with games involving winning payouts, such as the popular television game show entitled "WHEEL OF FORTUNE," will realize that as players and observers watch a large wheel spin and gradually come to rest, the players experience a heightened feeling of anticipation and excitement as the wheel is slowing down to indicate a possible prize.

[0012] The use of bonus games has been beneficial in the initial attraction of players to a primary gaming machine and the placement of a wager for play of the primary game. However, there is potential for further improvement in the manner in which the secondary or bonus game operation and outcome may be visibly displayed as well as in how the secondary or bonus game itself may be characterized or "themed."

BRIEF SUMMARY OF THE INVENTION

[0013] Various embodiments of the present invention comprise methods of playing games, gaming devices and table games utilizing a primary game, e.g., rotatable reels, and at least one discernible indicia of a secondary game, preferably comprising a payout indicator. The secondary game is separate from the primary game either physically or temporally.

[0014] According to the most preferred embodiments, a bonus payout indicator is clearly visible to a player and is operable when primary reels of a primary game slot machine stop on certain predetermined indicia. According to one preferred embodiment of the present invention, a secondary payout indicator is in the form of a rotatable bonus wheel which can be caused to spin automatically or in response to some action by a player, e.g., the player pushing a button, when the primary game indicates one of a predetermined plurality of indicia. The wheel is caused to gradually reduce speed and, when the wheel stops, a pointer indicates the payout to be awarded to the player.

[0015] Another preferred embodiment of the present invention further comprises a discernible multiplier which provides the ability to change the payout from either the primary gaming unit or the secondary payout indicator, or both. As described in more detail below, it is within the scope of the present invention to provide a payout from the primary gaming unit, a payout indicated by the secondary indicator only, a payout from the primary gaming unit or the secondary indicator as changed by the multiplier, or a separate plurality of payouts from the primary gaming unit and the secondary indicator either with or without modification by a multiplier.

[0016] According to one preferred embodiment of the present invention, the mechanical bonus payout indicator is electronically operated and is linked to a random number generator which determines where the secondary indicator actually stops.

[0017] According to another preferred embodiment of the present invention, when the primary unit stops on one of a predetermined plurality of winning indicia sets, a second event actuator is placed in an active state. According to this embodiment, a person, such as the player, must actuate the actuator in order to operate the bonus indicator.

[0018] According to another embodiment of the present invention, the bonus actuator requires operator intervention so that a player must involve a casino attendant who can activate the bonus indicator.

[0019] According to another preferred embodiment of the present invention, the bonus indicator is connected to a drive mechanism which gradually reduces the rate of spin of the bonus wheel before the bonus wheel stops.

[0020] Still other embodiments of the present invention comprise gaming devices having electronic means for displaying indicia of rotatable reels such as a video screen and/or means for displaying indicia of a secondary payout indicator, such as a video screen. The present invention also comprises methods for playing a game of chance. One preferred method comprises the steps of displaying a first randomly selected combination of indicia, the displayed indicia selected from the group consisting of slot reels, indicia of at least one reel, indicia of at least one playing card, and combinations thereof; generating at least one signal corresponding to at least one select display of first indicia; and providing at least one discernible indicia of a mechanical bonus indicator, the bonus indicator indicia indicating at least one of a plurality of possible payouts, wherein the bonus indicator indicia providing means is operatively connected to a first, standard gaming unit and actuatable in response to said signal. According to one preferred embodiment, the discernible indicia of a mechanical bonus indicator gradually reduces the rate of movement of the mechanical bonus indicator for some period of time prior to actually providing the discernible indicia of a payout. According to another embodiment, a multiplier is provided to multiply at least one payout by a multiple which is most preferably indicated to a player. The multiple can preferably sequentially change as discernible indicia change. For example, a plurality of multiples can be synchronized with a plurality of discernible indicia on the mechanical bonus indicator such that the multiple changes as the payout indicated changes.

[0021] Further embodiments of the present invention comprise a method of conducting a game of chance comprising the steps of providing a player with an opportunity to place a wager; displaying a randomly selected combination of indicia, the displayed indicia selected from the group consisting of reels, indicia of at least one and preferably a plurality of reels, indicia of at least one and preferably a plurality of playing cards, and combination thereof; generating at least one signal corresponding to at least one select display of the indicia; providing at least one discernible indicia of a mechanical bonus indicator, the bonus indicator indicia indicating at least one of a plurality of possible bonuses, wherein the bonus indicator indicia is in the form of a wheel or reel and is actuatable in response to the signal.

[0022] Other embodiments provide methods and gaming devices wherein a secondary gaming unit selects and displays a secondary indicia and the winning award to a player is the product of the amount wagered by the player and the secondary indicia.

[0023] In a further embodiment of the present invention, a game outcome display element rotatable about a substantially upright axis is employed to display or simulate the operation of a game of chance and is further employed to display the outcome of the game. This embodiment is especially suitable for use in bonus games, but is not so limited.

[0024] In such an embodiment of the present invention, a rotatable outcome display element is oriented for rotation about a substantially upright axis to indicate a payout at cessation of rotation by alignment with an outcome indicator element. As used herein in its broadest sense, the term "upright" includes and encompasses not only a vertical orientation but also an orientation at any acute angle to the vertical. As with the preceding embodiments, the outcome of the game may be determined through the use of a random number generator, as known in the art, prior to initiation of rotation of the outcome display element. A drive assembly, such as, for example, a stepper motor and driver may be used to power rotation of the outcome display element, the driver being used to control the relative locations of mutually adjacent, circumferentially spaced regions of the outcome display element, each region being indicative of a potential game outcome, and stopping rotation of the outcome display element with a region selected by the random number generator aligned with the outcome indicator element to indicate the outcome of the game and associated payout.

[0025] In some exemplary implementations of this embodiment of the present invention, the outcome display element may be configured as a sphere positioned to rotate about a substantially upright axis extending substantially through its diameter. The sphere may be circumferentially segmented into a plurality of mutually adjacent sectors which may be characterized as resembling slices of an orange, each sector having associated therewith and displaying a potential game outcome of a plurality of outcomes represented by the number of sectors of the sphere. The axis of rotation of the sphere may be substantially vertical, or inclined at an acute angle to the vertical. As the sphere rotates, each sector passes by, through or under an outcome indicator element, the game outcome being established by the sector finally aligned with the outcome indicator element when rotation of the sphere ceases.

[0026] In another exemplary implementation of this embodiment of the present invention, the outcome display element may be configured as an upright gem, for example a diamond, positioned to rotate about a substantially upright, central longitudinal axis. The diamond or other gem may be circumferentially segmented into a plurality of mutually adjacent facets as would be apparent on the exterior of an actual diamond or other gem, each facet having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of facets of the diamond. The axis of rotation of the diamond may be substantially vertical, or inclined at an acute angle to the vertical. As the diamond rotates, each facet passes by, through or under an outcome indicator element, the game

outcome being established by the facet finally aligned with the outcome indicator element when rotation of the diamond ceases.

[0027] Other and further configurations for outcome display elements oriented for rotation about a substantially upright axis are contemplated and encompassed by the present invention, as are games of chance employing such outcome display elements.

[0028] As used herein, the term "game of chance" includes and encompasses not only games having a random or arbitrary outcome, but also such games which also invite or require some player input to the game having at least a potential for affecting a game outcome. Such player input is generally termed "skill" whether or not such input is in actuality beneficial in terms of game outcome.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] FIG. 1 is a perspective view one of a gaming device of one embodiment of the present invention;

[0030] FIG. 2 is another embodiment of a gaming device of the present invention;

[0031] FIG. 3 illustrates an alternative embodiment of the present invention;

[0032] FIG. 4 is an alternative embodiment of the present invention in the form of a table game;

[0033] FIG. 5 illustrates a sample of three reel strips which may be used on the primary gaming unit;

[0034] FIG. 6 illustrates one embodiment of the payout window used in conjunction with the primary gaming unit shown in FIG. 5;

[0035] FIG. 7 illustrates one embodiment of the secondary gaming unit in the form of a rotatable wheel;

[0036] FIGS. 8A and 8B respectively comprise front and side elevations of a first exemplary implementation of one embodiment of a gaming device of the present invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0037] FIGS. 9A and 9B respectively comprise front and side elevations of a second exemplary implementation of one embodiment of a gaming device of the present invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0038] FIGS. 10A and 10B respectively comprise front and side elevations of a third exemplary implementation of one embodiment of a gaming device of the present invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0039] FIGS. 11A and 11B respectively comprise front and side elevations of a fourth implementation of one embodiment of a gaming device of the present invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0040] FIGS. 12A, 12B and 12C respectively comprise front, side and perspective elevations of a fifth implementation of one embodiment of a gaming device of the present

invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0041] FIGS. 13A, 13B and 13C respectively comprise front, side and perspective elevations of a sixth implementation of one embodiment of a gaming device of the present invention employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation;

[0042] FIG. 14 is a schematic architecture for an exemplary gaming device suitable for use with the present invention;

[0043] FIG. 15 is a schematic of a plurality of networked gaming devices linked to a central server computer;

[0044] FIG. 16 is a schematic of a plurality of networked gaming devices incorporated in a multi-site gaming system; and

[0045] FIG. 17 is an exemplary implementation of a further embodiment of an outcome display element assembly suitable for use with the present invention and which may be implemented as perceptibly rotatable as well as physically rotatable.

DETAILED DESCRIPTION OF THE INVENTION

[0046] The various embodiments of the present invention are designed to provide added excitement to a board/table game or gaming device in order to increase the enjoyment of players and to serve as an added attraction to potential players. One preferred embodiment of the present invention, illustrated in FIG. 1, comprises a primary gaming unit which comprises three rotatable reels 10, each of which comprises a plurality of indicia on the periphery thereof. The illustrated gaming device comprises a mechanical lever 12, coin slot 14, currency validator 16 and credit card validator 18. In a manner which will be recognized by those skilled in the art, each reel 10 is designed to rotate and then stop in order to visually display at least one, and preferably a number of, indicia. If the collection of indicia displayed by the three reels is one of a predetermined plurality of winning indicia sets, then the player can typically be provided with a winning payout either through coin chute 20, which deposits winnings into a coin trough 30 or by increasing the player's credits in a credit window 40.

[0047] According to one aspect of the present invention, when the reels 10 display at least one of a plurality of predetermined winning indicia or indicia sets, then the player is provided with an opportunity for a secondary payout. According to this illustrated embodiment of the present invention, a bonus actuator button 50 is placed in an operative state when reels 10 display a bonus indicia set. A player must then depress bonus actuator 50 in order to start bonus indicator 70 spinning. In the illustrated embodiment, bonus indicator 70 is in the form of a rotatable wheel. The wheel may be a carnival-type wheel comprising pegs and a clapper or could take one or more other forms, such as a fanciful wheel typically used in a roulette game as shown in the embodiment of FIG. 2. If a preferred motor-driven wheel is utilized, it is preferably linked to some random value generator in order to randomly determine where the wheel will actually stop. In order to enhance the playing

experience, sound effects corresponding to a clapper slapping against pegs of a carnival wheel are preferably provided as the wheel passes from one segment to another. The bonus indicator 70 is also preferably controlled so that the rate of spin is reduced, most preferably gradually reduced, prior to stopping in order to simulate a mechanical spinning wheel.

[0048] The facing surface of bonus indicator 70 of FIG. 1 comprises four distinct areas bearing indicia of the bonus payout to the player. In the illustrated embodiment, the bonus indicator has areas indicating bonuses of \$25.00, \$50.00, \$100.00, and \$2,000.00. When bonus indicator 70 stops, an indicator (not shown) will indicate the area on the bonus wheel corresponding to the amounts of the bonus to be provided to the player.

[0049] In a manner which will be appreciated by those skilled in the art, bonus indicator 70 can be operatively linked to a "payout" mechanism which provides a bonus payout to a player through coin chute 20 or by increasing the amount of winnings shown in credit window 40. As stated above, the payout of the bonus indicator can be in addition to a standard payout by the primary gaming unit or can be in place of the payout normally associated with the primary gaming unit.

[0050] Those familiar with gaming and game shows, will appreciate that players and observers typically experience a heightened level of anticipation and excitement as they observe one or more moving objects approaching a winning position. It is, therefore, most preferred for the bonus indicator of the present invention to be readily discernible, e.g., clearly visible and/or audible to the player.

[0051] According to another preferred embodiment of the present invention, a bonus indicator is connected to an electronic control unit, for example, a motor, which gradually decreases the rate of movement of the bonus indicator before the bonus indicator stops. According to this embodiment of the present invention, players can be provided with a realistic sense of a totally mechanical indicator. Those skilled in the art will appreciate that such a control unit can also be readily connected to a random generator which will randomly select the winning payout according to a predetermined frequency of occurrence for each, individual bonus payout, and then cause the bonus indicator to stop at the desired area. Those skilled in the art will also appreciate that other mechanisms can be utilized for gradually decreasing the rate of movement of the secondary payout indicator, e.g., a controlled braking system.

[0052] According to another embodiment of the present invention, when reels 10 display an indicia set which will provide a bonus, the bonus indicator becomes activatable but requires intervention by a house attendant, such as a casino attendant, in order to be activated. According to this embodiment of the present invention, the casino is provided with greater control over the actuation of the bonus indicator and, if desired, can accompany the actuation of the bonus indicator with great fanfare. It will be appreciated that the amounts of the bonus indicated in the figures are merely for purposes of illustration and, if desired, one of the amounts on the bonus indicator can have a significantly greater value. For example, one of the areas on the bonus indicator may correspond to a new automobile, a luxury vacation or a very large sum of money.

[0053] While the illustrated embodiment of the present invention in FIG. 1 is generally in the form of a rotatable wheel, other visible, mechanical indicia can be provided, whether controlled totally mechanically, electro-mechanically, or electronically, without departing from the scope of the present invention.

[0054] As shown in FIG. 1, in order to provide additional levels of excitement, indicia of the possible bonuses are preferably visibly displayed within the slot machine. For example, in one illustrated embodiment, a shelf is preferably displayed comprising piles of currency equal to the amounts on the bonus indicator. While actual cash is preferred, the slot machine may also be provided with fake currency or simply indicia of actual currency or the other bonus prizes.

[0055] A preferred embodiment of the present invention is illustrated in FIG. 2 wherein a gaming device 100 comprises a primary gaming unit in the form a standard three-reel slot machine which displays reels 110. Suitable controls and currency mechanisms including a coin slot 114, bill validator 118, payout chute 120 are provided. Furthermore, suitable player controls including CHANGE button 132, CASH/CREDIT button 134, BET ONE button 136, SPIN button 138 and BET MAX button 130 are also provided.

[0056] In addition to these standard controls, the control panel of this preferred illustrated embodiment of the present invention comprises a SPIN THE WHEEL button 140, which becomes actuatable when the primary gaming unit, as indicated by reels 110, has randomly selected one of a plurality of predetermined indicia sets. While the primary gaming unit shown in the lower portion of the cabinet of gaming device 100 will typically have the ability to provide a plurality of winning payouts, the SPIN THE WHEEL button 140 can become actuatable when the stopped reels 110 indicate some subset of the primary unit's winning indicia, when any one of the winning reel indicia is displayed, or further in response to one or more other predetermined indicia, or a combination thereof. For example, the SPIN THE WHEEL feature, or some other secondary game, can be actuated or become activatable in response to a single indicia indicated on one of the reels or reel indicia.

[0057] When the SPIN THE WHEEL button 140 is actuated by a player, bonus wheel 150 is caused to rotate and randomly select and display one of a plurality of different areas. According to the preferred illustrated embodiment, all of the bonus areas indicate an increased winning value for the player. However, it is within the scope of the present invention to provide nonmonetary prizes or losing spaces wherein no additional prize is provided and/or wherein the prize normally associated with the indicia shown on the primary gaming unit reels 110 is reduced. In the illustrated embodiment, a pointer 160 advantageously indicates the result of the bonus wheel or indicator 150.

[0058] In addition to the bonus wheel 150, this preferred illustrated embodiment of the present invention also comprises a bonus multiplier 170. The bonus multiplier 170 preferably randomly selects a value by which the bonus indicated by bonus wheel 150 is multiplied. For example, the bonus multiplier 170 can have an LED screen which cycles through multipliers of "times one," "times two" and "times three," which will indicate that the bonus is as indicated, doubled, or tripled, respectively. The bonus multiplier 170 can be programmed to select a multiplier either

totally randomly or according to some other predetermined frequency of occurrence wherein certain multipliers will occur more frequently than other multipliers. While this illustrated embodiment comprises whole number multipliers, it is also within the scope of the present invention to utilize values other than whole numbers or to include multipliers which will result in a decrease in the value shown by the bonus wheel or indicator 150. For example, a multiplier sequence could include a "times zero" value. When bonus wheel or indicator 150 is not in use, the multiplier LED window can be set to an attract mode wherein a message is displayed to players or potential players. For example, the LED display could either show a message in complete form or be set to sequentially display either words or individual letters, such as "SPIN-THE-WHEEL."

[0059] According to the various embodiments of the present invention, the bonus multiplier or additional payout multiplier is most preferably synchronized with the movement of the rotatable wheel or indicia of a rotatable reel, such that the multiplier value will change as each wheel segment passes the indicator. The most preferred embodiments of the present invention additionally comprise audible signals, such as the clicking of a clapper of the type found on an actual spinning wheel comprising a clapper indicator and pegs which strike the clapper. The audible signals are preferably also synchronized with the segments of the wheel such that an audible signal is provided as the wheel moves from one segment to another. This advantageously provides the effect of a mechanical wheel comprising pegs moving past a mechanical clapper.

[0060] FIG. 3 illustrates a less preferred embodiment of the present invention wherein a gaming device 200 comprises similar controls as the controls illustrated in the embodiment of FIG. 2. In this illustrated embodiment, a bonus indicator 250 is in the form of an electronically generated image, such as a video screen or an LED display and provides discernible indicia, e.g., a visual video display, of a bonus wheel. For example, the video display can show a wheel of the type used in a roulette game such as the wheel 150 illustrated in FIG. 2.

[0061] The slot machine shown in FIG. 3 comprises a video display 210, such as a video screen, which displays three reels 110, each of which comprise a plurality of indicia. In addition, this slot machine comprises a video display for displaying bonus indicator 250, such as a second video screen. While separate screens are preferred, both the reels and the bonus payout indicator could be displayed on the same video screen. According to this embodiment of the present invention, the bonus payout indicator displays indicia of a wheel or a reel.

[0062] In a manner known in the art, the gaming device comprises a coin slot 214, a currency validator 218, and a coin chute 220. After placing a wager, a player determines the amount of his wager by either pressing the BET ONE button 236 or the BET MAX button 230. After the player has selected the amount of his wager, he depresses the SPIN button 238, which "spins" the reels shown in the window of video display 210.

[0063] Each indicia of a displayed reel 110 is designed to indicate rotation and then stop in order to visually display at least one, and preferably a number of indicia. When reels 110 display a particular indicia set or one of a predetermined

plurality of indicia sets in video display 210, then the additional payout mode is activated and the video display displaying payout indicator 250 is placed in an operable state. In this illustrated embodiment, the displayed payout indicator 250 displays an indicia of a rotating wheel comprising a plurality of distinct areas bearing indicia of payouts to the player. Payout indicator 250, is caused to selectively indicate one of the plurality of indicia, either automatically, upon intervention of a casino or house attendant, or upon a player depressing SPIN THE WHEEL button 240 in order to start payout indicator 250 spinning. It will be appreciated that the amounts of the payout indicated in FIG. 3 are merely for purposes of illustration and, if desired, one of the amounts on the bonus indicator can have a greater value, e.g., a new automobile, a luxury vacation or large sum of money which may be collected subsequently, or lesser values, e.g., no payout.

[0064] The displayed reels 110 and displayed bonus indicator 250 can be operably controlled by suitable controls to gradually slow down as they come to a complete stop, displaying a selected reel indicia and a bonus indicia, respectively.

[0065] The embodiment of the present invention illustrated in FIG. 2 is considered most preferable since it is believed that players prefer to see actual slot reels and an actual bonus wheel spinning in a gaming device. Other, less preferred embodiments are also possible while providing some of the advantages of the present invention. Specifically, it is feasible to replace the spinning reels with other forms of standard gaming units, for example, a visible indicia of reels or indicia of playing cards, shown, for example, on a video screen. It is also possible to replace the wheel with some other discernible indicia of a mechanical bonus indicator which is operatively connected to the first standard gaming unit and which either automatically commences or is actuable in response to the result provided by the standard gaming unit. According to the present invention, both the standard gaming unit and the bonus indicator are controlled to provide random results.

[0066] From the foregoing description, it will be appreciated that embodiments of the present invention, which are specifically directed to gaming and gaming devices, comprise three different indicators. The most preferred embodiments comprise a primary (standard) gaming unit, an additional payout indicator, preferably in the form of a wheel, and a payout multiplier. While the payout multiplier of the illustrated embodiments is in the form of an electronically selected value, it is also within the scope of the present invention to have a multiplier which involves some skill on the part of a player. For example, according to an additional preferred embodiment of the present invention, a player will shoot actual projectiles, such as coins, at one or more targets in an effort to increase the value of the multiplier. In any of the embodiments of the present invention utilizing a multiplier, the multiplier can affect the value of a payout from the standard gaming unit, the additional payout indicator, or both the standard gaming unit and the payout indicator.

[0067] As stated above, the present invention also includes methods of conducting a wagering game of chance comprising the steps of providing a player with an opportunity to place a wager; displaying a randomly selected combination of indicia, the displayed indicia selected from the group

consisting of reels, indicia of reels, indicia of playing cards, and combination thereof; generating at least one signal corresponding to at least one select display of the indicia; and providing at least one discernible indicia of a mechanical bonus indicator, the bonus indicator indicia indicating at least one of a plurality of possible bonuses, wherein the bonus indicator indicia is in the form of a wheel or reel and is actuable in response to the signal. A further preferred method comprises the step of displaying at least one value by which a payout may be multiplied.

[0068] Another method of the present invention comprises the steps of requiring at least one player to make a wager; displaying at least one randomly selected playing card from a predetermined card indicia set; displaying and rotating a rotatable wheel comprising a plurality of indicia corresponding to a plurality of prizes if the displayed playing card indicia was one of a preselected plurality of winning card indicia; and determining a winning payout with the wheel, wherein the winning payout is randomly selected.

[0069] Another embodiment of the present invention in the form of a table game is illustrated in FIG. 4 wherein a chip rack 310, card shoe 320, discard shoe 330, wager slot 340, betting areas 350, and secondary event wheel or payout indicator 360 are provided. According to this embodiment of the present invention, after one or more players have placed wagers in wagering areas 350, a dealer will provide cards to the wagering players in areas 355 and then provide cards to himself in card area 370. After the cards have been dealt, the initial bets can be resolved by comparing the players' cards to the dealer's cards. While the illustrated game is shown as five card stud poker, other games and arrangements can also be utilized without departing from the scope of the present invention. For example, a player's cards can be compared to other player's cards or a predetermined payout schedule, or other card games can be utilized including seven card draw, five card draw poker, black jack, etc.

[0070] Upon the happening of a predetermined occurrence, such as the receipt of one of a preselected plurality of card hands, one or more of the players can be given the opportunity to spin the payout indicator 360, which is most preferably electronically operated by an actuation switch. The actuation switch can be within reach of the players for added excitement or can be actuated by the dealer. Alternatively, actuation by a player's actuator switch can require prior actuation of a dealer switch, which will then render the player's switch operable. If less than all of the players are going to benefit from the results of payout indicator 360, additional indicators can be positioned proximate the players in order to indicate which players are involved in the spin of payout indicator 360. In a manner similar to that shown in FIG. 2, a payout multiplier 380 is also provided. Sound effects as referenced above and means for gradually decreasing the rate of movement of the payout indicator 360 are also preferably provided.

[0071] In addition to the primary gaming unit or primary game, the secondary event, and the multiplier, another preferred aspect of the present invention which can be utilized with all previously described embodiments comprises a DOUBLE-OR-NOTHING feature wherein winning players may wager their winnings in a double-or-nothing fashion. According to this feature of the present invention, a player may be provided with the opportunity to bet on red or

black after he has won a game. For this purpose, the rotatable wheels of the present invention are preferably provided with alternating red and black pie-shaped segments. According to this feature, a player can be provided with the opportunity of betting on red or black with the opportunity of doubling his winnings if he makes a correct selection. After the player makes his selection, the wheel would be rotated to determine whether the player has successfully doubled his winnings or has lost those winnings. A player may be provided with the opportunity of utilizing the double or nothing feature several times and/or up to a certain maximum to be determined by the game operator.

[0072] Another embodiment of the present invention comprises a method of conducting a game of chance wherein a player is provided with an opportunity to place at least one of a plurality of possible initial wagers. The initial wager either activates a primary gaming unit or renders the primary gaming unit activatable by the player, for example, by illuminating a button. The primary gaming unit displays a randomly selected primary display which, if it is one of a preselected plurality of primary displays, qualifies the player to receive a primary award, to play a secondary gaming unit, or both.

[0073] FIG. 5 illustrates a sample of three reel strips 410, 420, and 430 which may be used on the primary gaming unit in conjunction with the payout window shown in FIG. 6. As illustrated, this embodiment of the present invention provides a player with nine paylines. According to the present invention, the player can be provided with a single payline for each coin wagered or, alternatively, a plurality of paylines, depending upon the number of coins wagered. For example, a player can get one payline for wagers of one to five coins while a player would receive a second payline for wagers of six to ten coins, and so on to a maximum number of nine paylines for a wager of forty-five coins.

[0074] The secondary gaming unit of this embodiment of the present invention is intended to become activatable if the player receives a predetermined outcome on the primary gaming unit.

[0075] According to this embodiment of the present invention, a secondary gaming unit displays a plurality of secondary indicia, which when selected, is multiplied by the amount wagered by the player to determine the player's winning award from the secondary gaming unit. The secondary gaming unit is most preferably in the form of a rotatable wheel, such as the wheel shown in FIG. 7, or can comprise a wheel indicator wherein the wheel and the indicator are relatively movable. Other aspects and features of the embodiments of the present invention described above can also be advantageously combined with this embodiment as well as the other embodiments described herein. For example, the secondary gaming unit is most preferably only activatable if the player wagers one of a preselected plurality of possible wagers, such as the maximum wager. Those skilled in the art will appreciate that the degree of excitement to the player will be maximized with maximum wagers. Other aspects, such as the doubling feature described above, can also be provided to the player after the secondary indicia has been displayed by the secondary gaming unit.

[0076] FIGS. 8 through 13 of the drawings depict a number of exemplary implementations of an embodiment of

the present invention (hereinafter referred to as the "upright rotational axis embodiment" employing a rotatable outcome display element oriented for rotation about a substantially upright axis of rotation to indicate a payout at cessation of rotation by alignment with at least one outcome indicator element. In FIGS. 8 through 13, elements and features common among the various implementations illustrated are identified by the same reference numerals.

[0077] FIGS. 8A and 8B depict an exemplary implementation 600a of the upright rotational axis embodiment employed as a bonus or secondary game in association with a primary or base game, implementation 600a being configured as a top box placed on top of a conventional gaming device 500 configured as a multi-reel slot machine. Gaming device 500, as illustrated, includes a housing 502 including a plurality of independently rotatable reels 504, each reel bearing a number of different indicia or symbols (not shown), as known in the art. Suitable controls and currency mechanisms including a coin slot 506, bill validator 508, payout chute 510 and a player input element in the form of movable handle 512 are provided. Furthermore, suitable player controls including a CHANGE button, a CASH/CREDIT button, a BET ONE button, a SPIN button and a BET MAX button as discussed with respect to preceding embodiments may also be provided. As known in the art, housing 502 rests upon base 520 to place gaming device 500 at a convenient elevation for play.

[0078] Implementation 600a of the upright rotational axis embodiment includes a housing 602 configured with a three-dimensional representation of a female fortune teller 604 having her hands positioned over an outcome display element configured as a sphere 606 in the form of a crystal ball rotatable about a vertical axis and perceptibly resting on a base 608b having a pointer-style outcome indicator element 610p protruding upwardly therefrom. By way of example, implementation 600a may be offered as a game entitled "Madame Fortune," with appropriate signage. Sphere 606 is segmented into a plurality of mutually circumferentially adjacent sectors 612 which may be characterized as resembling slices of an orange, each sector 612 having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of sectors 612 of the sphere 606. As depicted, the game outcomes displayed on the sectors 612 are characterized numerically as payouts, for example as the number of coins per payout. As shown, sphere 606 is partially enclosed by housing 602 so that only substantially one half of sphere 606 is visible, and a transparent, hemispherical envelope 614 extends over the visible portion of sphere 606. A candle 616 as known in the art surmounts housing 602.

[0079] Referring to FIGS. 9A and 9B, implementation 600b of the upright rotational axis embodiment is depicted employed as a bonus or secondary game in association with a primary or base game 500 includes a housing 602 bearing a heading "Ball&Change" positioned over an outcome display element in the form of a sphere 606 rotatable about a vertical axis and having associated therewith a pointer-style outcome indicator element 610p protruding upwardly from the underlying portion of housing 602. Sphere 606 is segmented into a plurality of mutually circumferentially adjacent sectors 612 which may be characterized as resembling slices of an orange, each sector 612 having associated therewith, and displaying, a potential game outcome of a

plurality of outcomes represented by the number of sectors of the sphere 606. As depicted, the game outcomes displayed on the sectors 612 are characterized numerically as payouts, for example as the number of coins per payout. As shown, sphere 606 is partially enclosed proximate its midsection by housing 602 so that only a front portion 606a and a rear portion 606b of sphere 606 are visible, and transparent, hemispherical envelopes 614a and 614b respectively extend over the front and rear visible portions 606a and 606b of sphere 606. A candle 616 as known in the art surmounts housing 602.

[0080] Referring to FIGS. 10A and 10B, implementation 600c of the upright rotational embodiment is depicted employed as a bonus or secondary game in association with a primary or base game 500 includes a housing 602 bearing a heading "SpinDazzle" positioned over a display element formed as a sphere 606 rotatable about a vertical axis and having associated therewith a pointer-style outcome indicator element 61p protruding upwardly from the underlying portion of housing 602. Sphere 606 is segmented into a plurality of mutually adjacent sectors 612 which may be characterized as resembling slices of an orange, each sector 612 having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of sectors of the sphere 606. Sectors 612 may be surfaced with reflective elements and lights from inside housing 602 or outside aimed at sphere 606 for entertainment effect. As depicted, the game outcomes displayed on the sectors 612 are characterized numerically as payouts, for example as the number of coins per payout. As shown, sphere 606 is partially enclosed proximate its midsection by housing 602 so that only a front portion 606a and a rear portion 606b of sphere 606 are visible, and transparent, hemispherical envelopes 614a and 614b respectively extend over the front and rear visible portions 606a and 606b of sphere 606. A candle 616 as known in the art surmounts housing 602.

[0081] Referring to FIGS. 11A, 11B and 11C, implementation 600d of the upright rotational embodiment is depicted employed as a bonus or secondary game in association with a primary or base game 500 which, in this instances, displays a plurality of reels 504. Alternatively, and as well known in the art, reel simulations 504s on a video display 530 configured, for example, as a flat panel display, may be employed. Implementation 600d includes a housing 602 configured as a regular shell segment or valve of a bivalve mollusk bearing a heading "Pearl-a-Whirl" positioned over an outcome display element in the form of a sphere 606 having a pearlescent surface finish so as to resemble a pearl from an oyster. Sphere 606 is rotatable about an upright axis oriented at an acute angle to the vertical although, of course, implementation 600d may be configured with sphere 606 rotatable about a substantially vertical axis, as with other embodiments, and neither this embodiment or other embodiments are limited to exemplary axis orientations shown and described herein. Sphere 606 is segmented into a plurality of mutually circumferentially adjacent sectors 612 which may be characterized as resembling slices of an orange, each sector 612 having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of sectors of the sphere 606. As depicted, the game outcomes displayed on the sectors 612 are characterized numerically as payouts, for example as the number of coins per payout. As shown, sphere 606 is

partially enclosed by housing 602 so that only somewhat less than one half of sphere 606 is visible, and a transparent, partially hemispherical envelope 614 extends over the visible portion of sphere 606. An outcome indicator element 610p in the form of a pointer as shown in broken lines in FIG. 11A may be employed to indicate the sector 612 exhibiting the game outcome. A candle 616 as known in the art surmounts housing 602, as shown in FIG. 11B. As further depicted in broken lines in FIG. 11B sphere 606 is mounted for rotation on axle 620, which projects upwardly from stepper motor and driver assembly 622. As shown, axle 620 is cantilevered, but it is also contemplated that axle 620 may be supported by a bearing secured to housing 602 at the upper end of axle.

[0082] Referring to FIGS. 12A, 12B and 12C, implementation 600e of the upright rotational embodiment is depicted employed as a bonus or secondary game in association with a primary or base game 500s which is configured as a so-called "slant" housing gaming device having a housing 502s bearing an upwardly-facing video display screen 530. Of course, a plurality of mechanical or electromechanical reels may also be employed to display the primary or base game 500s and its outcome. Such gaming devices may be configured for display of video images of rotatable reels, for play of video poker, blackjack, keno or bingo, or for any other suitable game of chance susceptible to video depiction. Player control elements and devices for inputting wagers are shown (unnumbered) as known in the art. Implementation 600e includes a housing 602 bearing a line of lights L which positioned over a sphere 606 rotatable about a vertical axis and having associated therewith vertically aligned pointer-style outcome indicator elements 610p respectively protruding upwardly from the underlying portion of housing 602 and downwardly from the overlying portion thereof and carrying an intermediate overlay element 610OL therebetween. Sphere 606 is segmented into a plurality of mutually adjacent sectors 612 which may be characterized as resembling slices of an orange, each sector 612 having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of sectors of the sphere 606. Sectors 612 may be surfaced with reflective elements and lights from inside housing 602 or outside aimed at sphere 606 for entertainment effect. As depicted, the game outcomes displayed on the sectors 612 are characterized numerically as payouts, for example as the number of coins per payout. As shown, sphere 606 is partially enclosed proximate its midsection by housing 602 so that only a front portion 606a and a rear portion 606b of sphere 606 are visible, and transparent, hemispherical envelopes 614a and 614b respectively extend over the front and rear portions 606a and 606b of sphere 606. Hemispherical envelope 614a may have pointer-style outcome indicator elements 610p and overlay 610OL imprinted or etched thereon. Fiber optic cables may be used, as known in the art, to illuminate overlay 610OL for emphasis on the sector underlying same when sphere 606 ceases rotation.

[0083] Referring to FIGS. 13A and 13B, implementation 600f of the upright rotational embodiment is depicted employed as a bonus or secondary game in association with a primary or base game 500 includes a housing 602 bearing a heading "DIAMOND RING" positioned over a rotatable outcome display element configured as a gem and specifically as a diamond 606d, rotatable about a vertical axis and having associated therewith a pointer-style outcome indica-

tor element 610p protruding upwardly from a representation of a "mounting" 608m for the "diamond" 606d and carried by the underlying portion of housing 602. It is contemplated that the implementation 600f may also be offered, by way of example, as a game entitled "Forever Diamonds," such title if employed being substituted for that shown in FIG. 13A. Diamond 606d is segmented into a plurality of mutually adjacent facets 612f which may be characterized as resembling facets of a jewel-cut diamond, each facet 612f having associated therewith, and displaying, a potential game outcome of a plurality of outcomes represented by the number of sectors of the diamond 606d. As depicted, the game outcomes displayed on the facets 612f are characterized numerically as payouts, for example as the number of coins per payout. Diamond 606d may be illuminated from the interior thereof, or by lights carried by housing 602 and directed thereon. As shown, diamond 606d is partially enclosed proximate its midsection by housing 602 so that only a front portion 606da and a rear portion 606db of diamond 606d are visible, and transparent, hemispherical envelopes 614a and 614b respectively extend over the front and rear visible portions 606a and 606b of sphere 606. A candle 616d for use as known in the art but configured in a novel manner as superimposed diamonds surmounts housing 602.

[0084] In use and operation, and referring to FIG. 14, the system architecture for an exemplary gaming device 800 suitable for use in practicing the present invention includes a processor board 842, a main board 844 and a back plane 846 integrally or separately formed. The processor board 842 includes a video expansion board VGA/SVGA 848 that is operably coupled to the main board 844. The main board 844 preferably includes memory in the form of ROM, RAM, flash memory and EEPROM (electrically erasable programmable read only memory). The ROM includes the EEPROM. In addition, the main board 844 includes a system event controller, the random number generator, a win decoder/pay table, status indicators, a communications handler and a display/sound generator.

[0085] The main board 844 is operably coupled to the back plane 846 which includes memory, preferably in the form of an EEPROM and connectors to connect to peripherals. Furthermore, the back plane 846 provides a plurality of communication ports for communicating with external peripherals. The back plane 846 provides the coupling between discrete inputs 850 and the processor 848 and main board 844. Typical examples of elements, which provide discrete inputs, are coin acceptors, game buttons, mechanical hand levers, key and door switches and other auxiliary inputs. Furthermore, the back plane 846 provides the coupling between discrete outputs 852 and the processor and main board 844. Typically, elements that provide discrete outputs are in the form of lamps, hard meters, hoppers, diverters and other auxiliary outputs.

[0086] The back plane 846 also provides connectors for at least one power supply 854 for supplying power for the processor and a parallel display interface ("PDI") 856 and a serial interface 858. In addition, the back plane 846 also provides connectors for a soundboard 860 and a high-resolution monitor 862 as well as a display interface 856 operably coupled to at least one game display device 878. Furthermore, the back plane 846 includes communication ports for operably coupling and communicating with an

accounting function 864, a touch screen 866, the bill validator 1054, a printer 868, an accounting network 870, a progressive current loop 872 and a network link 874.

[0087] The back plane 846 optionally includes connectors for external video sources 880, expansion buses 882, game or other display means 884, a SCSI port 888 and an interface 890 for at least one card reader 892 (debit/credit, player card, etc.) and key pad 894. The back plane 846 also preferably includes means for coupling a plurality of reel driver boards 896 which drive physical game reels 898 with a shaft encoder or other sensor means to the processor 848 and main board 844. Such an approach may, of course, also be used to drive a outcome display elements as employed in bonus games according to the present invention. Of course, the reels may be similarly implemented electronically by display as video images, technology for such an approach being well known and widely employed in the art. In such an instance, reel driver boards 896 and physical game reels 898 with associated hardware are eliminated and the game outcome generated by the random number generator on main board 844 is directly displayed on a video game display 884 and, optionally, on a separate game device display 878, as known in the art. Other gaming machine configurations for play of different wagering games such as video poker games, video blackjack games, video Keno, video bingo and any other suitable games are equally well known in the art.

[0088] It will also be understood and appreciated by those of ordinary skill in the art that selected components of gaming device 800 may be duplicated for play of a bonus or secondary game or event in accordance with the present invention, in that at least a separate board with a second random number generator may be employed, with associated peripherals and links thereto, for play of the bonus game. In the conventional situation wherein the bonus game of the present invention may be operably coupled as a "top box" or otherwise associated with a conventional, existing game machine configured for play of a base or primary game, many of the components illustrated in FIG. 14 and described with respect thereto will be duplicated, including separate hardware, software and associated memory for conducting play of the bonus game with associated pay tables for bonus awards.

[0089] In implementation of the present invention, the gaming machines offering play of the bonus event of the present invention may be deployed, as schematically depicted in FIG. 15, in a gaming network 910 includes a central server computer 920 operably coupled to a plurality of gaming machine $G_1, G_2 \dots G_n$ which may include both electronic and reel type game machines. It is notable that, unless the gaming network is 910 is configured for progressive play, a variety of different makes of gaming machines G offering widely different games may be incorporated in gaming network 910, since the bonus event operates independently of the primary game on each gaming machine G . The central server computer 920 may be programmed to automatically interact with a plurality of gaming machines $G_1, G_2 \dots G_n$ during a bonus game triggered on any of them, and to initiate rotation of the outcome indicator display element thereof.

[0090] More specifically, and referring to FIGS. 14 and 15, the gaming network 910 includes, a central server

computer 920, a bonus event computer 940 and a plurality of gaming machines $G_1, G_2 \dots G_n$. Each gaming machine G , includes a controller assembly 980 operably coupled to the central server computer 920 and is comprised of a controller unit designed to monitor multiple signals from each individual gaming machine G_n . In addition, the assembly 980 includes a network interface board fitted with appropriate electronics for each specific make and model of each individual gaming machine G_n .

[0091] Referring to FIG. 15, in electronic video games, the central server computer 920 is operably coupled to at least one video display element 818 as shown at the left hand side of FIG. 15 and sequesters a portion of the video display element 818 for displaying video attract sequences to attract potential players. Video game display element 818 may be used for display of both primary and bonus games, as desired. Where the gaming network 910 includes reel type gaming machines $G_1, G_2 \dots G_n$ as shown at the right hand side of FIG. 15, the central server computer 920 may be operably coupled to at least one active display element 820 so that potential players receive a clear indication of attract sequences and the at least one active display element 820 may be used as a video display for a bonus game, if such employs video rather than movable mechanical elements. As shown at the left hand side of FIG. 15, the gaming machines $G_1, G_2 \dots G_n$ may also be provided with a second video display 822 as an alternative to sequestering a portion of the gaming display monitor for displaying video attract sequences and the bonus game. In addition, the central server computer 920 includes sound generating means for producing attractive sounds at each gaming machine G_n which are orchestrated with the video sequences at each of gaming machines $G_1, G_2 \dots G_n$ of such is not already incorporated therein. The games support input and output between the player and the game for such devices as heads up display, joystick, keyboard, mouse and data glove via interface modules connected through the expansion bus or buses 882 and SCSI port 888.

[0092] The attractive multimedia video displays and dynamic sounds may be provided by the central server computer 920 by using multimedia extensions thereby allowing gaming machines $G_1, G_2 \dots G_n$ to display full-motion video animation with sound to attract potential players to the machines. During idle periods, the gaming machines preferably display a sequence of attraction messages in sight and sound. The videos may also be used to market specific areas of the casino and may be customized to any informational needs.

[0093] Furthermore, the gaming network 910 includes bonus computer 940 operably coupled to the central server 920 for scheduling bonus parameters such as the type of bonus game, pay tables and players. Preferably, the gaming network 910 further includes a real-time or on-line accounting and gaming information system 960 operably coupled to the central server computer 920. The accounting and gaming information system 960 includes a player database for storing player profiles, a player tracking module for tracking players and a pit, cage and credit system for providing automated casino transactions.

[0094] As previously implied, a bank of gaming machines $G_1, G_2 \dots G_n$ may be networked together in a progressive configuration, as known in the art, wherein a portion of each

wager to initiate a primary game may be allocated to bonus event awards. In addition, and referring to FIG. 16, a host site computer 1020 is operably coupled to a plurality of the central server computers 920 at a variety of remote casino or other gaming sites $C_1, C_2 \dots C_n$ for providing a multi-site linked progressive automated bonus gaming system 1010.

[0095] The host site computer 1020 may be maintained for the overall operation and control of the automated bonus gaming system 1010. The host site computer 1020 includes a computer network 1022 and a communication link 1024 provided with a high-speed, secure modem for each individual casino site $C_1, C_2 \dots C_n$.

[0096] Each casino site $C_1, C_2 \dots C_n$ includes a central server computer 920 provided with a network controller 930 which includes a high-speed modem operably coupled thereto. Bidirectional communication between the host site computer 1020 and each casino site central server computer 920 is accomplished by the set of modems transferring data over dedicated communication link 1024.

[0097] A network controller 930, a bank controller 932 and a communication link 934 are interposed between each central server 920 and the plurality of attached gaming machines $G_1, G_2 \dots G_n$ at each casino site $C_1, C_2 \dots C_n$. In addition, the network controller 930, the bank controller 932 and the communication link 934 are interposed between each central server 920 and a separate display 936, if employed, at each casino site C_n . However, the system 310 may include means to loop-back data for in-machine meter displays to communicate with bonus award insert areas on gaming machines $G_1, G_2 \dots G_n$.

[0098] FIG. 17 depicts a further embodiment of an outcome display element assembly 1200 and associated components, elements and features, which assembly provides a visually perceptible representation of rotation of an outcome display element. In fact, no actual physical rotation of outcome display element 1206, shown configured as a sphere, may be employed or, as hereinafter discussed, outcome display element 1206 may be made rotatable for enhanced visual effect. Outcome display element 1206 is hollow, includes an opening 1207 in the bottom thereof, and may be configured as a sphere (shown), a diamond, an ovoid or other suitable shape. Outcome display element 1206 is suspended from above by a portion of a housing 1202 extending thereover in arch-like fashion. The wall W of the sphere is translucent, so as to enable the interior thereof to function as a projection screen. As shown, projector 1220 is mounted for rotation about an axis substantially coincident with a longitudinal axis L, and in the illustrated case a diameter, of outcome display element 1206. Projector 1220 extends upwardly into outcome display element 1207, and includes a plurality of lenses 1222, each of which has associated therewith a slide element (not shown) as known in the still image projection art, each slide element comprising a transparency of a bonus indicia or symbol to be projected onto the interior of outcome display element 1206. A high intensity lighting element 1224 on the interior of projector 1220 emits light through the lenses, causing the bonus symbols on the slide elements to be projected in a focused manner on the interior of outcome display element so as to be visible from the exterior thereof. Rotation of projector 1220, which may be effected by a stepper motor and driver assembly as described above with respect to the

embodiments of FIGS. 8 through 13, causes the projected bonus indicia or symbols to perceptibly rotate, simulating the rotation of outcome display element 1206. An outcome indicator element 610p, shown in FIG. 17 as a pointer-type element, may be employed to designate the location of the bonus indicia or symbol representing a value of the bonus award, as in the embodiments of FIGS. 8 through 13. To further enhance the clarity of separation between mutually circumferentially adjacent projected bonus indicia or symbols, outcome display element may have sectors 612 identified thereon as in prior embodiments, the sectors 612 divided by dark or even opaque lines 612L therebetween. To further enhance the effect of the visual display, it is also contemplated that outcome display element may be rotated about axis L in the same direction, or opposite direction, to projector 1220 and simultaneously therewith. Either outcome display element 1206, projector 1220, or both, may be caused to gradually slow in rate of rotation as described above with respect to other embodiments. Further, the relative orientations and mounting points for outcome display element 1206 and projector 1220 may be reversed, so that projector 1220 is suspended downwardly from housing 1202 into outcome display element 1206.

[0099] While the outcome indicator elements of the present invention have been described in exemplary fashion and with respect to specific exemplary implementations, those of ordinary skill in the art will understand that any suitable outcome indicator element may be employed. For example, an arrow image may be projected onto or adjacent the surface of the outcome display element sector exhibiting the value of the bonus award for a game. The outcome indicator element may be configured as a pointer and counter-rotated with respect to the outcome display element about the same axis. Multiple, circumferentially separated pointers may be used, and the pointer coming to rest at a selected circumferential point used to identify the bonus award. In such a manner, different values may be associated with different pointers so that the pointers (or other outcome indicator elements) may be used as payout multipliers for the bonus award, for the primary game outcome, or both, as desired. The outcome indicator element may further be configured as a frame or partial frame, showing a bonus value of a selected sector within the boundary thereof.

[0100] It will also be understood and appreciated that the outcome display elements of the present invention may be driven as previously described by way of example, or in any other suitable manner providing adequate control and precision of the final rotational position thereof. For example, an outcome display element in the form of a sphere may be made of, or coated with, a ferromagnetic material or have discrete magnets placed inside, suspended in mid-air using air pressure or supported by low-friction bearings, and rotated through a magnetic coupling driven (as an example) by a stepper motor and driver assembly. Similarly, the outcome display element may be magnetically suspended from a housing through a magnetic coupling, as well as rotated thereby. Further, the outcome display element may be rotated through use of a gear extending about the axis of rotation and on the exterior of the outcome display element proximate the upper or lower end thereof (with respect to the length of the axis of rotation), the gear being engaged by another, cooperative gear or toothed drive belt drive by a motor, the area of engagement being hidden by a decorative

envelope configured, for example and with respect to the embodiment of FIGS. 8A-8C, the base of a crystal ball.

[0101] While the present invention has been disclosed with reference to certain illustrated embodiments, those of ordinary skill in the art will understand and appreciate that it is not so limited. Many additions and modifications to, and deletions from, the embodiments disclosed herein may be made without departing from the scope of the invention. Similarly, features and elements from one embodiment may be combined freely with features and elements of other embodiments, the scope of the invention being limited only by the claims which follow herein.

What is claimed is:

1. A gaming device, comprising:

a first gaming unit configured to randomly generate and display a combination of indicia from a first plurality of indicia, at least some possible combinations of indicia of said first plurality comprising winning combinations enabling associated winning payouts; and

a bonus gaming unit configured to randomly generate an outcome for a bonus game and including an outcome display element mounted for rotation about a substantially upright axis and having a plurality of mutually circumferentially adjacent regions on an exterior surface thereof, at least some of the regions including one indicium of a second plurality of indicia associated with at least two different bonus game outcomes, the outcome display element having associated therewith a drive assembly configured to rotate the outcome display element about the substantially upright axis in association with play of the bonus game and to cease rotation of the outcome display element responsive to generation of the bonus game outcome with a region of the outcome display element in alignment with at least one outcome indicator element to indicate a randomly generated bonus game outcome.

2. The gaming device of claim 1, wherein the bonus gaming unit is configured for enablement to randomly generate a bonus game outcome responsive to generation of a winning combination of indicia by generation of at least one winning combination of indicia of said first plurality by said first gaming unit.

3. The gaming device of claim 2, wherein the bonus gaming unit is configured for enablement of the drive assembly to rotate the outcome display element responsive to the generation of a bonus game outcome.

4. The gaming device of claim 1, wherein the bonus gaming unit is configured for enablement of the drive assembly to rotate the outcome display element responsive to generation of a winning combination of indicia by generation of at least one winning combination of indicia of said first plurality by said first gaming unit.

5. The gaming device of claim 1, wherein the outcome display element comprises a sphere.

6. The gaming device of claim 5, wherein the regions comprise sectors of the sphere.

7. The gaming device of claim 6, wherein the at least one outcome indicator element comprises a pointer.

8. The gaming device of claim 1, wherein the outcome display element is configured as a gem.

9. The gaming device of claim 8, wherein gem is faceted, and the regions comprise facets of the gem.

10. The gaming device of claim 8, wherein the at least one outcome indicator element comprises a pointer.

11. The gaming device of claim 1, wherein at least some of the indicia of the second plurality of indicia comprise numbers.

12. The gaming device of claim 1, wherein only a portion of the outcome display element is visible.

13. The gaming device of claim 12, wherein the visible portion of the outcome display element is visible from a front of the gaming device.

14. The gaming device of claim 12, wherein the visible portion of the outcome display element comprises a visible front segment and a visible rear segment.

15. The gaming device of claim 1, wherein the first plurality of indicia are displayed by structure selected from the group consisting of reels, indicia of reels, indicia of playing cards and combinations thereof.

16. The gaming device of claim 1, wherein the outcome display element is configured to continuously include the same second plurality of indicia thereon.

17. The gaming device of claim 16, wherein the first plurality of indicia are displayed by structure selected from the group consisting of reels, indicia of reels, indicia of playing cards and combinations thereof.

18. The gaming device of claim 1, further comprising a payout multiplier operably linked to at least one of the first gaming unit and the bonus gaming unit, the payout multiplier configured to alter a payout value of an outcome of at least one of the first gaming unit and the bonus gaming unit.

19. The gaming device of claim 18, wherein the payout multiplier is configured to display a plurality of numbers by which a payout value may be multiplied.

20. The gaming device of claim 18, wherein the payout multiplier is configured to display at least one message other than a number by which a payout value may be multiplied.

21. The gaming device of claim 18, wherein the payout multiplier is configured to randomly select an indicia by which a payout value may be altered.

22. The gaming device of claim 18, wherein the payout multiplier is configured for control, at least in part, by a player.

23. The gaming device of claim 1, further comprising an input device operably coupled to the bonus gaming unit to actuate the bonus gaming unit responsive to receiving player input, wherein the input device is enabled by generation of at least one of the winning combinations of indicia of the first plurality by the first gaming unit.

24. A method of conducting a game of chance, comprising:

initiating play of a primary game;

in association with play of the primary game, randomly selecting an indicia combination from a plurality of available indicia associated with the primary game and displaying the selected indicia combination on a display structure;

generating at least one signal corresponding to at least one select combination of indicia of the first plurality of available indicia; and

randomly selecting at least one discernible indicia of a bonus game outcome from a plurality of available discernible indicia associated with at least two different bonus game outcomes, displaying the plurality of avail-

able discernable indicia in mutually circumferentially adjacent relationship on an outcome display element rotatable about a substantially upright axis, rotating the outcome display element, ceasing rotation of the outcome display element to indicate the at least one randomly selected discernible indicia and providing a payout associated with said at least one discernable indicia responsive at least in part to generation of said at least one signal.

25. The method of claim 24, further comprising providing a drive assembly to rotate the outcome display element.

26. The method of claim 25, further comprising enabling the drive assembly responsive to the generation of a bonus game outcome.

27. The method of claim 25, further comprising enabling the drive assembly to rotate the outcome display element responsive to generation of at least one select combination of indicia during play of the primary game.

28. The method of claim 24, further comprising configuring the outcome display element as a sphere.

29. The method of claim 28, further comprising displaying one indicium of the plurality of available discernible indicia on each of a plurality of mutually circumferentially adjacent sectors of the sphere.

30. The method of claim 24, further comprising configuring the outcome display element as a gem.

31. The method of claim 30, further including providing the gem with facets, and displaying one indicium of the plurality of available discernible indicia on each of a plurality of mutually circumferentially adjacent facets of the gem.

32. The method of claim 24, further comprising the available discernible indicia as numbers.

33. The method of claim 24, further comprising partially enclosing the outcome display element so that only a portion thereof is visible.

34. The method of claim 24, further comprising the selected indicia combination using structure selected from the group consisting of reels, indicia of reels, indicia of playing cards and combinations thereof.

35. The method of claim 24, further comprising randomly selecting at least one discernible indicia of a bonus game outcome responsive to receiving player input and enabling receipt of player input responsive to generation of the at least one signal.

36. A gaming device, comprising:

a bonus gaming unit configured to randomly generate an outcome for a bonus game and including an outcome display element mounted for rotation about a substantially upright axis and having a plurality of mutually circumferentially adjacent regions on an exterior surface thereof, each of the regions including one indicium of a second plurality of indicia associated with at least two different bonus game outcomes, the outcome display element having associated therewith a drive assembly configured to rotate the outcome display element about the substantially upright axis in association with play of the bonus game and to cease rotation of the outcome display element responsive to generation of the bonus game outcome with a region of the outcome display element in alignment with at least one outcome indicator element to indicate a randomly generated bonus game outcome.

37. The gaming device of claim 3, wherein the outcome display element comprises a sphere.

38. The gaming device of claim 37, wherein the regions comprise sectors of the sphere.

39. The gaming device of claim 38, wherein the at least one outcome indicator element comprises a pointer.

40. The gaming device of claim 36, wherein the outcome display element is configured as a gem.

41. The gaming device of claim 40, wherein gem is faceted, and the regions comprise facets of the gem.

42. The gaming device of claim 41, wherein the at least one outcome indicator element comprises a pointer.

43. A method of conducting a game of chance, comprising:

initiating play of a bonus game;

during play of the bonus game, randomly selecting at least one discernible indicia of a bonus game outcome from a plurality of available discernible indicia associated with at least two different bonus game outcomes, displaying the plurality of available discernible indicia in mutually circumferentially adjacent relationship on an outcome display element rotatable about a substantially upright axis, rotating the outcome display element, ceasing rotation of the outcome display element to indicate the at least one randomly selected discernible indicia and providing a payout associated with said at least one discernible indicia.

44. A method of conducting a game of chance, comprising:

initiating play of a game;

during play of the game, randomly selecting at least one discernible indicia of a game outcome from a plurality of available discernible indicia associated with at least two different game outcomes, displaying the plurality of available discernible indicia in mutually circumferentially adjacent relationship on an outcome display element rotatable about a substantially upright axis, rotating the outcome display element, ceasing rotation of the outcome display element to indicate the at least one randomly selected discernible indicia and providing a payout associated with said at least one discernible indicia.

45. A gaming device, comprising:

a first gaming unit configured to randomly generate and display a combination of indicia from a first plurality of indicia, at least some possible combinations of indicia of said first plurality comprising winning combinations enabling associated winning payouts; and

a bonus gaming unit configured to randomly generate an outcome for a bonus game and including an outcome display element configured to exhibit a visually perceptible representation of rotation about a substantially upright axis and having a plurality of mutually circumferentially adjacent regions visually apparent from an exterior surface thereof, at least some of the regions displaying one indicium of a second plurality of indicia associated with at least two different bonus game outcomes, the outcome display element having associated therewith an assembly configured to effect the visually perceptible representation of rotation of the outcome display element about the substantially upright axis in association with play of the bonus game and to cease the visually perceptible representation of rotation of the outcome display element responsive to generation of the bonus game outcome with a region of the outcome display element in alignment with at least one outcome indicator element to indicate a randomly generated bonus game outcome.

46. A method of conducting a game of chance, comprising:

initiating play of a primary game;

in association with play of the primary game, randomly selecting an indicia combination from a plurality of available indicia associated with the primary game and displaying the selected indicia combination on a display structure;

generating at least one signal corresponding to at least one select combination of indicia of the first plurality of available indicia; and

randomly selecting at least one discernible indicia of a bonus game outcome from a plurality of available discernible indicia associated with at least two different bonus game outcomes, displaying the plurality of available discernible indicia in mutually circumferentially adjacent relationship on an outcome display element, causing the outcome display element to exhibit a visually perceptible representation of rotation about a substantially upright axis, ceasing the visually perceptible representation of rotation of the outcome display element to indicate the at least one randomly selected discernible indicia and providing a payout associated with said at least one discernible indicia responsive at least in part to generation of said at least one signal.

* * * * *



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United States Patent [19]

Carroll

[11] **Patent Number:** **5,477,664**
 [45] **Date of Patent:** **Dec. 26, 1995**

[54] **COMPACT BALLOON INFLATER AND
LOADER APPARATUS AND METHOD**

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Utah

[73] **Assignee:** Maxim, Inc., Salt Lake City, Utah

[21] **Appl. No.:** 289,140

[22] **Filed:** Aug. 11, 1994

Related U.S. Application Data

[63] Continuation of Ser. No. 732,155, Jul. 18, 1991, Pat. No. 5,337,540.

[51] **Int. Cl.⁶** B65B 43/36; B65B 39/02

[52] **U.S. Cl.** 53/570; 53/262; 53/385.1;
53/386.1; 53/390

[58] **Field of Search** 53/403, 432, 441,
53/453, 459, 469, 479, 481, 79, 468, 86,
103, 512, 556, 559, 570, 385.1, 386.1,
390, 416, 433, 511, 255, 262; 141/10, 51,
59

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[57] **ABSTRACT**

Apparatus for inflating balloons to enable insertion therein of objects includes a loading ring insertable into the orifice or mouth of the balloon for stretching the orifice to allow insertion therethrough of an object into the interior of the balloon when inflated, and a balloon inflating housing for accommodating an inflated balloon. The housing includes upper and lower hemispherical shells which may be sealingly fitted together to form a complete spherical shell and to allow inflation of the balloon therewithin, and then separated to allow removal of the inflated balloon. The housing further includes an annular opening located in the upper hemispherical shell through which a balloon orifice may extend, a support ring disposed in the annular opening for receiving the loading ring so that a balloon in whose orifice the loading ring is inserted extends downwardly into the housing, and an opening in the lower hemispherical shell through which air may be evacuated from the housing to cause inflation of the balloon. The lower hemispherical shell may be coupled to a pump so that when the pump is operated, air from the interior of the housing is removed to thereby inflate a balloon disposed within the housing.

1 Claim, 3 Drawing Sheets

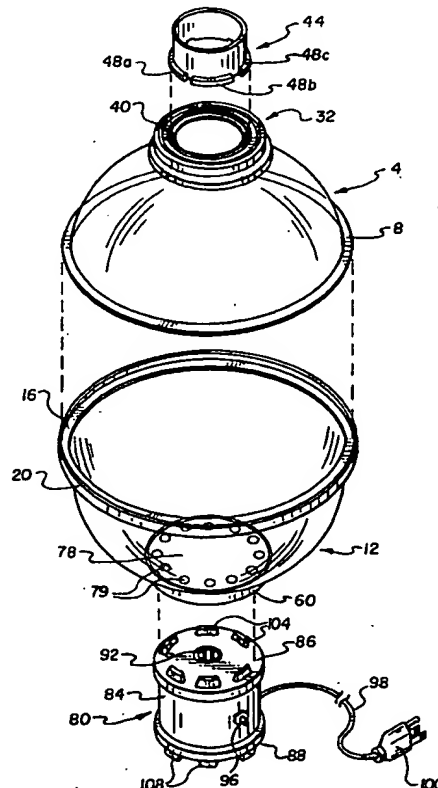


Fig. 1

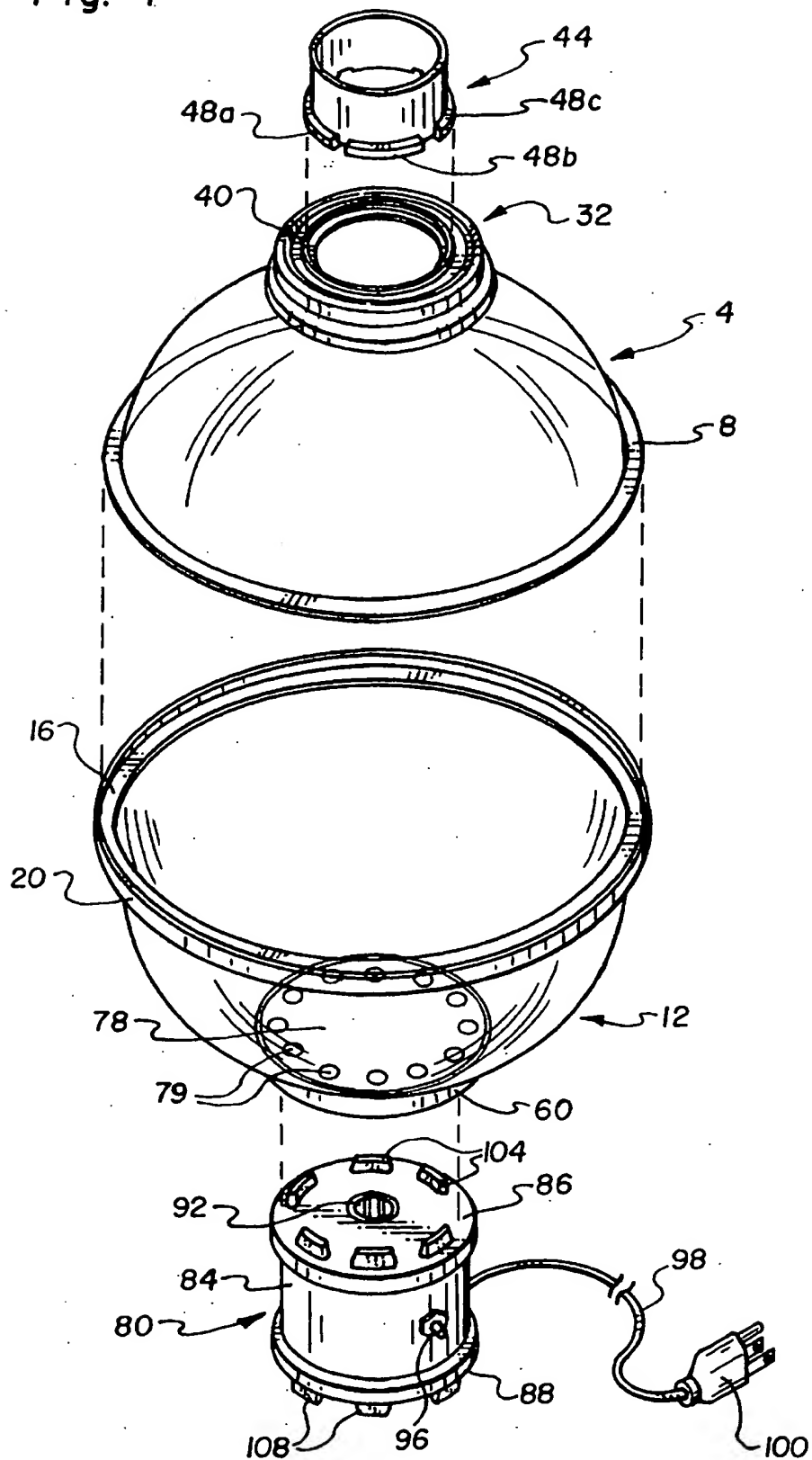
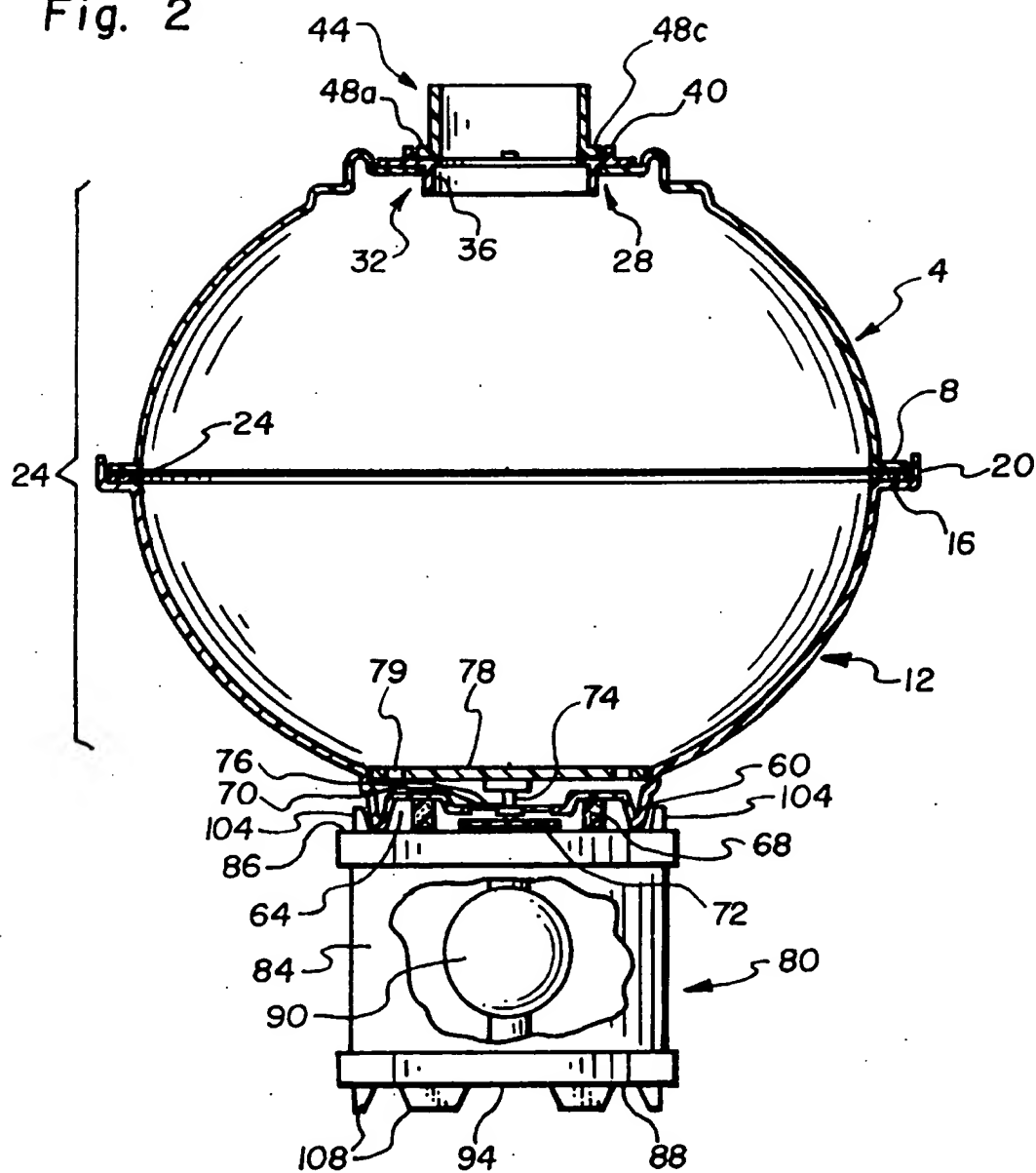
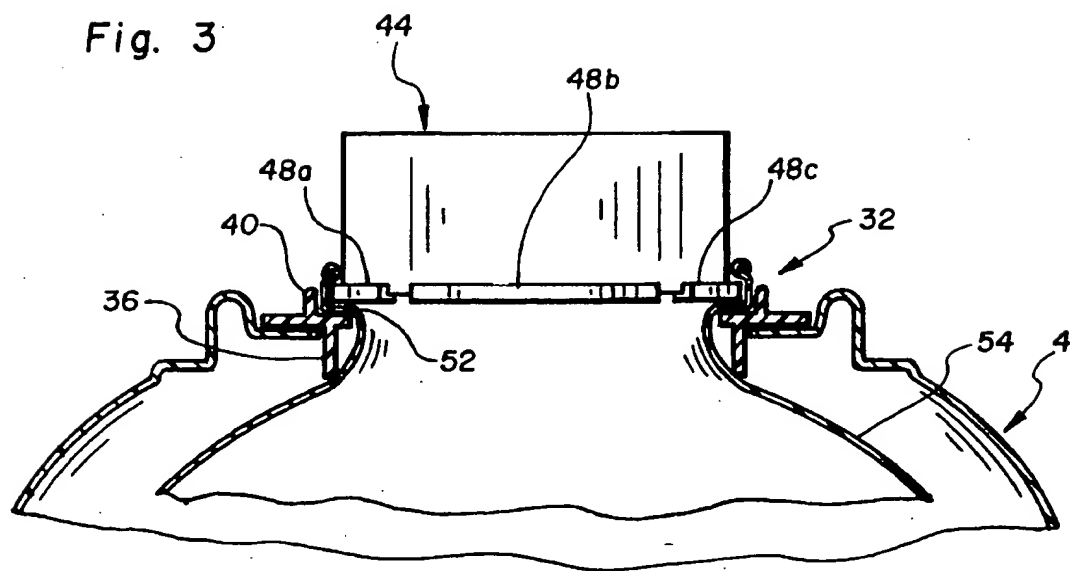


Fig. 2





COMPACT BALLOON INFLATER AND LOADER APPARATUS AND METHOD

This application is a continuation of application Ser. No. 07/732,155 filed Jul. 18, 1991 U.S. Pat. No. 5,337,540.

BACKGROUND OF THE INVENTION

1. Field

This invention relates to an apparatus and method for stretching the orifice of a balloon, inflating the balloon and inserting an object or objects into the inflated balloon.

2. Prior Art

A recently popularized packaging arrangement for gifts involves stretching the orifice or mouth of a balloon, inflating the balloon, inserting the gift into the inflated balloon, and then tying off the orifice to prevent the escape of air and to maintain the balloon, with the gift inside, in the inflated condition. The inflated balloon with gift can then be presented to the recipient.

A number of approaches and apparatus have been developed for inflating the balloon to allow insertion therein of the gift or other objects including what has been termed positive-pressure system such as disclosed in U.S. Pat. Nos. 4,809,483, 4,809,484, 4,811,841 and 4,878,335. In these systems, the balloon is inflated by forcing air under positive-pressure into the balloon to allow the ultimate insertion therein of the desired object. With these systems, typically some type of apparatus is necessary for moving the object from the positive-pressure source into the inflated balloon and so it is difficult to reorient or reposition the object in the balloon if such is necessary.

A more recent approach to inflating balloons to allow the insertion of objects therein involves the use of so-called negative-pressure systems such as disclosed, for example, in U.S. Pat. Nos. 4,924,919 and 4,974,393. In these systems, a balloon is positioned in a housing with the balloon orifice in communication with the outside. The housing is then evacuated of air to cause the balloon to expand. After expansion, and with the balloon orifice still exposed to the outside, the desired object can be inserted through the orifice into the interior of the balloon. With these systems, it is oftentimes easier to reorient or reposition the object inside the balloon to place it in precisely the position desired.

Another negative-pressure system presently available to the public includes upper and lower hemispherical shells which may be fitted together to form a complete spherical shell. The upper hemispherical shell includes an opening and a mounting ring fitted in the opening upon which a balloon orifice may be stretched and mounted so that the balloon depends into the spherical shell. The spherical shell is placable on an evacuation pump which, when operated, pumps air from the interior of the hemispherical shell out through openings in the lower hemispherical shell to cause the balloon to expand and allow insertion through the orifice of an object. The balloon orifice may then be tied off, the two hemispherical shells separated, and the balloon removed.

The above-described hemispherical shell arrangement, although quite compact and efficient in inflating a balloon to allow insertion of objects therein, has a number of drawbacks. Among these is the difficulty in mounting a balloon orifice on the ring fixed in the upper hemispherical shell. Such mounting requires the folding of the balloon orifice laterally and downwardly about an upstanding ridge and then pushing the balloon body through the opening and into the interior of the hemispherical shell. Another drawback is

the difficulty of maintaining the balloon in the inflated condition when the air pump is turned off to allow insertion of an object into the balloon. That is, the seal between the exterior of the balloon and the interior of the spherical shell is generally not reliable to prevent air from entering that space to cause deflation of the balloon. Still another drawback is the lack of an effective seal between the spherical shell and the pump motor housing which requires that the pump work harder to evacuate the spherical shell and maintain the balloon in the inflated condition.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a new and improved apparatus and method for efficiently and easily inflating a balloon to allow insertion therein of gifts and other objects.

It is also an object of the invention to provide such apparatus and method which may be easily manipulated and handled to install the balloon in position for inflation.

It is a further object of the invention to provide such apparatus and method in which a balloon may be maintained in the inflated position without continued operation of the evacuating pump by reason of provision of an effective seal between the exterior of the balloon and the interior of the inflating chamber.

It is still another object of the invention to provide such apparatus and method in which there is very little leakage of air at the interface between the inflating chamber and the evacuating pump.

It is an additional object of the invention to provide such apparatus and method in which a balloon to be inflated may be easily installed on a loading ring which is separate and apart from the rest of the housing.

The above and other objects of the invention are realized in a specific illustrative embodiment of apparatus for inflating balloons, such apparatus including a loading ring insertable in the orifice of a balloon for maintaining the orifice in an expanded condition to allow insertion therethrough of an object into the interior of the balloon when inflated, and a balloon inflating housing for accommodating an inflated balloon and onto which the loading ring may be fitted. The housing includes upper and lower hemispherical shells which may be sealingly fitted together to allow inflation of the balloon therewithin, and then separated to allow removal of the inflated balloon. The housing also includes an annular opening located in the upper hemispherical shell through which a balloon orifice may extend, a support ring disposed in the annular opening for receiving and holding the loading ring so that a balloon in whose orifice the loading ring is inserted extends downwardly into the housing, and an opening in the lower hemispherical shell through which air may be evacuated from the housing to cause inflation of the balloon. An evacuation pump is also provided to allow coupling to the lower hemispherical shell so that when the pump is operated, air is evacuated from the interior of the housing to thereby inflate a balloon disposed in the housing.

In accordance with one aspect of the invention, the support ring includes a downwardly extending lip positioned such that when a balloon is inflated, whose orifice is expanded about a loading ring, the support ring is expanded, the exterior of the balloon inflates to a sealingly contact to the lip to prevent the passage of air therebetween.

In accordance with another aspect of the invention, the support ring also includes an annular upstanding ridge within which the loading ring may be fitted and held in place.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the invention will become apparent from a consideration of the following detailed description presented in connection with the accompanying drawings in which:

FIG. 1 is a perspective, exploded view of the balloon inflating apparatus made in accordance with the principles of the present invention;

FIG. 2 is a side, elevational, partially cross-sectional view of the apparatus of FIG. 1; and

FIG. 3 is a side, partially cross-sectional, fragmented view of the upper portion of the apparatus of FIGS. 1 and 2.

DETAILED DESCRIPTION

Referring to the drawings, there is shown one illustrative embodiment of balloon inflating apparatus made in accordance with the present invention, which also may be used to practice the method of the present invention. The apparatus includes an upper hemispherical shell 4 made, for example, of clear plexiglass or plastic, and including an outwardly extending circumferential lip 8. Also included is a lower hemispherical shell 12 also advantageously made of clear plexiglass or plastic. Extending radially outwardly from the lower section 12 at the point of greatest diameter is a circumferential lip 16 having an upstanding ridge 20 for receiving and supporting the upper hemispherical shell 4 as best indicated in FIG. 2. A resilient seal 24, best seen in FIG. 2, is disposed on the lip 16 on the entire circumference of the lip to support and seal with the lip 8 of the upper hemispherical shell 4. The upstanding ridge 20 circumscribes the lip 8 to prevent lateral or sideways movement of the upper hemispherical shell 4 to in effect maintain the shell in place on the lower hemispherical shell 12. The upper hemispherical shell 4 and lower hemispherical shell 12 together form a complete a spherical shell 24, again as best seen in FIG. 2.

The top of the upper hemispherical section 4 is formed with an opening 28 into which is fitted an annular support ring 32. The support ring 32, which might illustratively be made of a rigid plastic, includes a downwardly extending annular lip 36 (best seen in FIG. 3) and an upwardly projecting annular ridge 40. The function of the lip 36 and ridge 40 will be discussed momentarily.

The support ring 32 is dimensioned to receive a loading ring 44 also made, for example, of a fairly rigid plastic. The loading ring 44 is in the form of a short hollow cylinder the lower end of which includes four laterally extending lip segments 48a, 48b, 48c and 48d (this last segment is not shown in the drawings). These lip segments are positioned co-circumferentially about the bottom of the loading ring 44, being separated by short gaps as shown.

The loading ring 44 is provided as a separate unit from the rest of the apparatus to allow easy insertion thereof into the orifice of a balloon. FIG. 3 shows graphically a balloon mouth 52 being stretched about the bottom of the loading ring 44 and over the lip segments 48. The lip segments, since they protrude laterally from the loading ring, serve to hold the balloon mouth or orifice onto the loading ring and prevent it from slipping off. Providing lip segments 48a, 48b, 48c and 48d makes it easier to insert the loading ring 44 into a balloon orifice since part of the orifice can be placed over a first one of the segments, then over a next adjacent segment, etc. until the orifice has been fitted over the entire lower circumference of the loading ring. When properly loaded, the loading ring 44, with balloon depending

therefrom, is placed on the support ring 32 at a position within and circumscribed by the upstanding ridge 40, as best seen in FIG. 3. As will be described later, in this position the balloon is ready to be inflated within the complete spherical shell 24 (FIG. 2) to allow insertion therein of a gift or other object.

The lower end of the lower hemispherical shell 12 is formed with an annular downwardly projecting base 60 for supporting the lower hemispherical shell when it is placed upon pump apparatus 80. Formed just radially inwardly of the annular base 60 is an upwardly formed depression 64 (FIG. 2) in which is disposed a resilient annular seal ring 68 made, for example, of resilient closed-cell foam rubber or similar resilient material. Centrally of the lower section of the lower hemispherical shell 12 is an opening 70 through which air may be withdrawn from the complete spherical shell 24 when using the apparatus to inflate a balloon. Disposed below the opening 70 to prevent air from entering the spherical shell 24 is a flexible disk 70 which, when air attempts to enter the shell, is pushed against the lip of the opening 70 to prevent air from entering the opening, but which, when air attempts to leave the spherical shell 24, flexes away from the opening 70 to allow the air to pass thereby. The disk 72, in effect, forms a one-way valve to allow the flow of air out of the spherical shell 24 but to prevent the flow of air therein. The disk 72 may be made of an air impervious, flexible piece of rubber or similar material. The disk 72 is held in place by a bolt 74 which, in turn, is mounted on a brace 76 disposed in the opening 70.

Mounted on the upper end of the bolt 74 is a floor 78 formed with a plurality of openings 79 disposed circumferentially near the outer edge of the floor. The openings 79 allow air to pass from the interior of the spherical shell 24 through to the opening 70 and then out the opening to the pump 80 as will next be discussed. The floor 78 and opening 79 allow a balloon to expand thereagainst while still allowing air to flow through the openings to escape the interior of the spherical shell 24 when the spherical shell is coupled to the pump 80.

The pump 80 includes a pump housing 84 having a top wall 86 and a bottom wall 88, and in which is located a pump motor 90 (FIG. 2) coupled to an opening 92 in the top wall 86 of the housing 84, and to an opening 94 in the bottom wall 88 of the housing. When the pump motor 90 is operated, air is drawn into the opening 92 and passed out of the opening 94 in a conventional manner. A switch 96 (FIG. 1) is provided to turn the pump motor 90 off and on, and a cord 98 and plug 100 are provided to connect the pump motor to a source of electrical power to operate the pump. Formed on the top wall 86 of the housing 84 are a plurality of co-circumferential, spaced-apart ridges 104 which circumscribe the annular base 60 when the spherical shell 24 is placed on the pump 80. The plurality of ridges 104 prevents the spherical shell 24 from moving laterally and sliding off the pump 80. Disposed on the bottom wall 88 of the housing 84 are a similar plurality of downwardly extending, co-circumferential and spaced-apart ridges or feet 108 for supporting the pump housing 84 above a surface on which it is placed and to allow air which is pumped from the top opening 92 out the bottom opening 94 to freely escape from under the housing. The upstanding ridges 104 and downwardly projecting ridges or feet 108 are positioned essentially identically to one another so that the feet 108 would likewise circumscribe the annular base 60 of the spherical shell 24 if the annular base were placed therewithin. Of course, the pump 80 may be readily turned upside down to pump and force air upwardly from the housing, as well as

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suck and force air into the pump when positioned in the right side up disposition. In this manner, the pump 80 may be readily used either to withdraw air from a spherical shell or, if the spherical shell were so adapted, pump air into the spherical shell depending upon whether the spherical shell were placed upon the top wall 86 or the bottom wall 88 respectively.

In use, a balloon orifice 52 of a balloon 54 (FIG. 3) is placed over the lower end of the loading ring 44 and specifically over the lip segments 48a, 48b, 48c and 48d so that the balloon extends downwardly into the interior of spherical shell 24 (FIG. 2). With the spherical shell 24 placed on the pump 80 as shown in FIG. 2 and when the pump motor 90 is turned on by operating a switch 96, air is drawn from the interior of the spherical shell through opening 79 and the opening 70 and through the opening 92 in the top wall 86 of the pump housing 84 and ultimately out of the opening 94 in the bottom wall 88 of the pump housing. As air is evacuated from the interior of the spherical shell 24, the balloon 54 is caused to expand since the only way air can enter the spherical shell is through the loading ring 44 and this causes the balloon to expand. The loading ring 44 with balloon 54 installed on the lower end thereof forms a seal with a support ring 40 to prevent air from passing between the loading ring and the support ring. As the balloon 54 expands, the outer surface of the balloon contacts the downwardly extending lip 36 of the support ring 32 to form a seal between the lip and the balloon to prevent the passage of air therepast. This aids in maintaining the balloon 54 in the expanded or inflated condition within the spherical shell 24 when the pump motor 90 is turned off. After the balloon is inflated, a gift or other object may be inserted through the loading ring 44 to the interior of the balloon as desired, and then the loading ring 44 is removed from the orifice or mouth 52 of the balloon. In this condition, the orifice may be tied off by using a tether or string to prevent the escape of air from the interior of the balloon, after which the upper hemispherical shell 4 may be removed from the lower hemispherical shell 12 and the balloon may then simply be removed from between the hemispherical shells in the inflated condition and containing the gift or other object.

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It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the and the appended claims are intended to cover such modifications and arrangements.

What is claimed is:

1. Apparatus for inflating balloons to enable insertion therinto of objects, comprising

a loading ring for holding the orifice of a balloon in an expanded condition to allow insertion therethrough of an object into the interior of the balloon when inflated,

a balloon inflating housing for accommodating an inflated balloon, said housing including

upper and lower hemispherical sections which may be sealingly fitted together to allow inflation of a balloon therewithin, and then separated to allow removal of the inflated balloon,

an annular opening located in the upper section, through which a balloon orifice may extend,

a support ring disposed in the annular opening for receiving the loading ring so that a balloon whose orifice is being held in an expanded condition extends downwardly into the housing, and

one or more openings in the lower sections through which air may be evacuated from the housing to cause inflation of the balloon,

pump means coupleable to the lower section of the housing and operable to pump air from the interior of the housing to thereby inflate a balloon disposed therein, and

wherein said loading ring comprises a short substantially rigid hollow solid wall cylinder having a lip formed to extend radially from one end thereof, over which a balloon orifice may be placed, said lip including a plurality of gaps spaced apart about the circumference thereof.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,477,664
DATED : Dec. 26, 1995
INVENTOR(S) : Carroll

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the title page, insert the following:

[*] Notice

The term of this patent shall not extend beyond
the expiration date of Patent Number 5,337,540

Signed and Sealed this
Tenth Day of September, 1996

Attest:



BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks

United States Patent [19]

Pongrass et al.

[11] Patent Number: 4,598,529

[45] Date of Patent: Jul. 8, 1986

[54] METHOD AND APPARATUS FOR FORMING, FILLING AND SEALING FLEXIBLE PLASTIC BAGS

[76] Inventors: Robert G. Pongrass, 122 Ocean Street, Woolhara 2025 New South Wales, Australia; Christopher C. Rutter, 21063 Cabot Blvd., Hayward, Calif. 94545

[21] Appl. No.: 692,539

[22] Filed: Jan. 18, 1985

[51] Int. Cl.⁴ B65B 3/02

[52] U.S. Cl. 53/452; 53/384; 53/468; 53/570

[58] Field of Search 53/51, 451, 452, 468, 53/558, 574, 384, 459, 570

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Primary Examiner—John Sipos

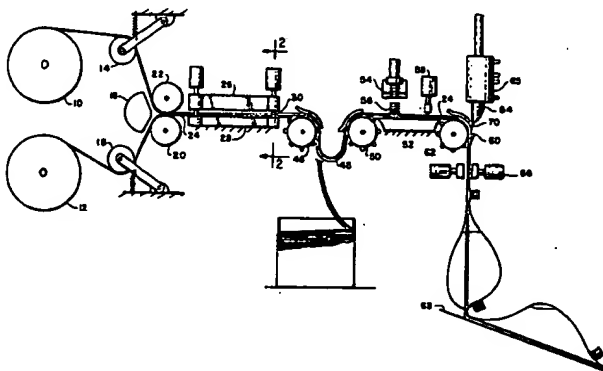
Assistant Examiner—Steven P. Weihrouch

Attorney, Agent, or Firm—Linval B. Castle

[57] ABSTRACT

A web of plastic bags is made from rollstock of a strong heat sealable plastic material for the bulk storage and dispensing of liquids by passing two aseptic sheets of the material into a press that heat bonds the longitudinal edges and laterally across the sheets to form a web of sealed bags. The longitudinally bonded strips are perforated to engage sprocket wheels which draw the web of bags to a position at which a dispensing fitment is bonded to the outer surface of one sheet, and then to a station which cuts a short lateral slit across only one sheet. The web then passes over and hangs from the sprocket so that the slit slightly opens to permit filling of the bag from the bottom up with a long pointed diving fill tube that isolates the bag contents from the slit. The area around the slit is then heat sealed against the opposite side of the bag to prevent leakage of the bag contents and the admission of contaminants into the bag.

7 Claims, 5 Drawing Figures



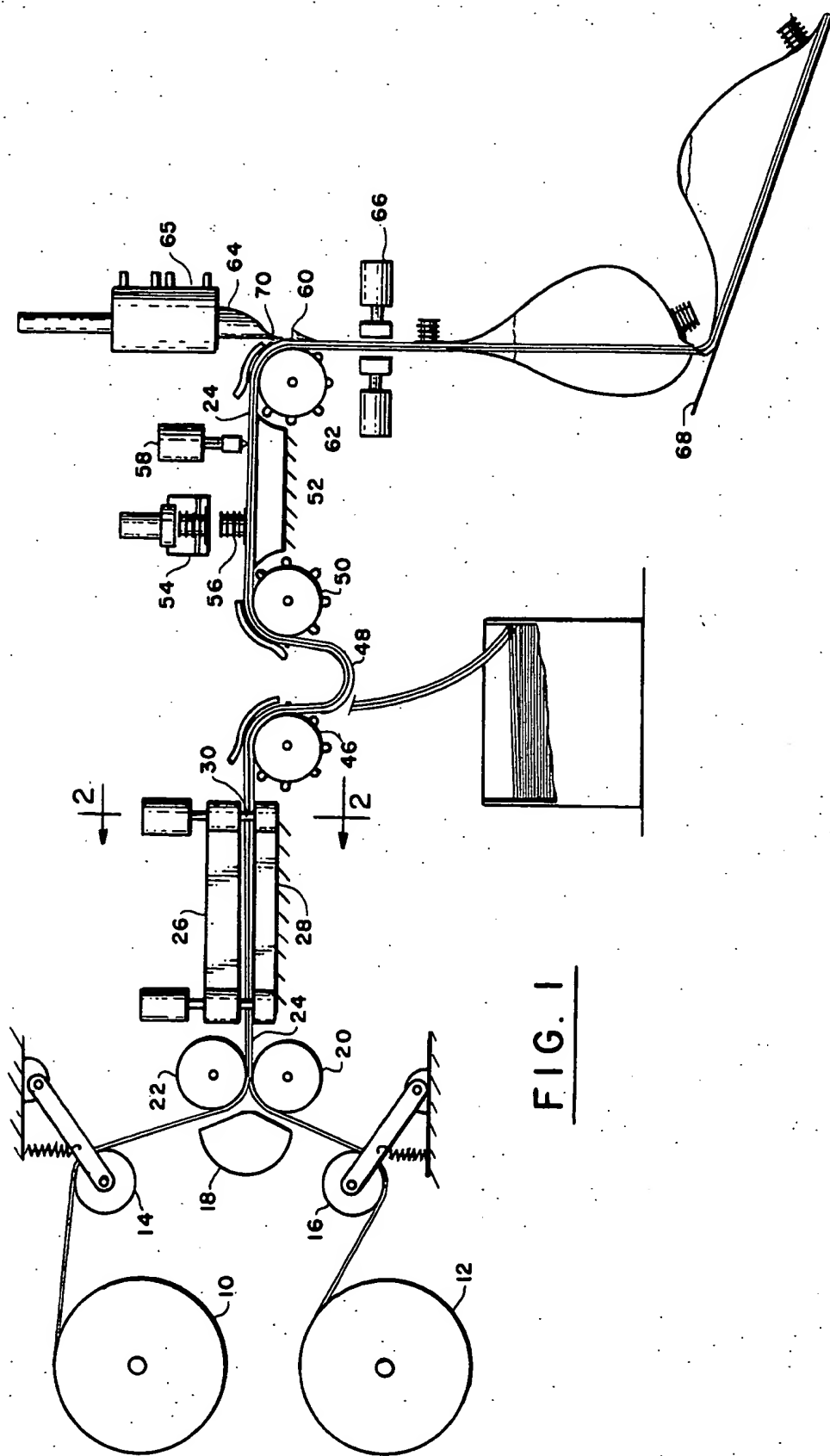


FIG. 1

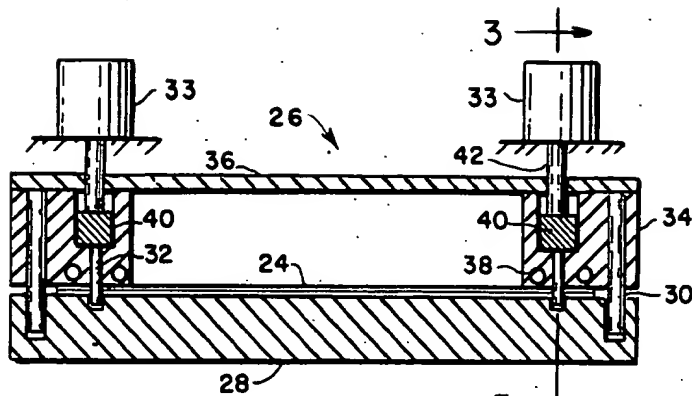


FIG. 2

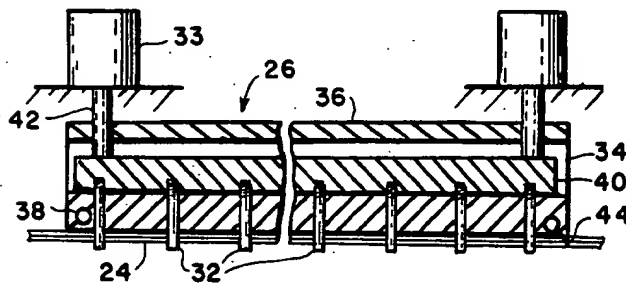


FIG. 3

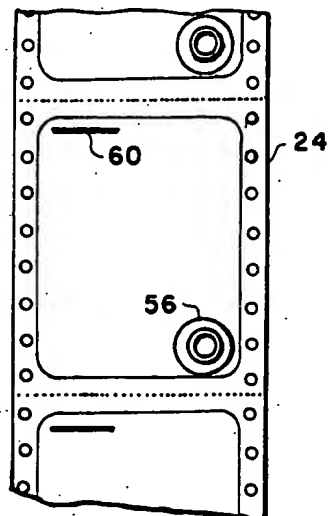


FIG. 4

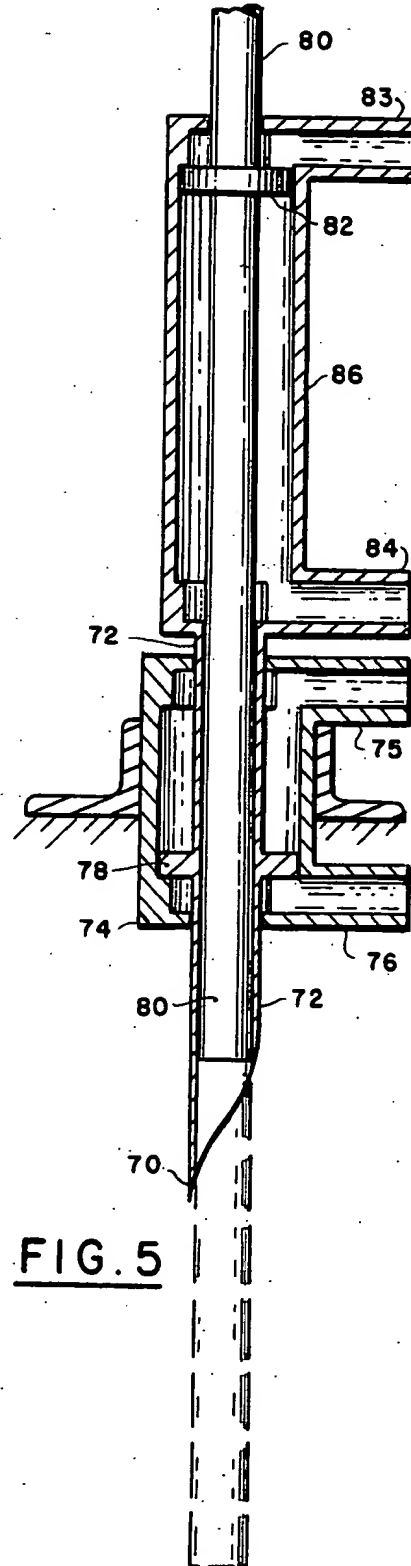


FIG. 5

METHOD AND APPARATUS FOR FORMING, FILLING AND SEALING FLEXIBLE PLASTIC BAGS

BACKGROUND OF THE INVENTION

This invention relates generally to the production of flexible, heat sealable, plastic bags and their subsequent filling and sealing, and in particular to a method and apparatus for forming a continuous web of sealed bags, the filling through a slit opening cut in each bag, and the heat sealing of the slits to reseal the bag for preserving an aseptic bag interior and for protecting the contents from contamination.

Flexible, heat sealable, bags formed with a lamination of Nylon or other strong flexible material, are extensively used in many industries and are particularly valuable for the packaging of fluids or fine granular materials. One important advantage of such packaging is that fluids such as juices, wines or the like are fully sealed against leakage in such a bag and, equally important, against the admission of air, gasses, moisture, or other objects that may damage the bag contents.

Flexible plastic bags for the storage and shipping of fluid products are generally formed with an attached fitment which opens into the bag for filling and eventual dispensing of the product. Often the filled bag is placed in a carton or other rigid container and a dispensing tap attached to an aperture in the carton is connected to the bag fitment for convenient dispensing of the contained product.

Flexible plastic bags or containers of the type described above have heretofore been manufactured by heat sealing the edges and by making lateral separations on two or more webs of thin heat sealable plastic. The sealed lateral bags are often separated by perforations for ease in separating the bags from the web and each bag in the web is provided with an attached open fitment for filling and dispensing, such as shown in U.S. Pat. No. 4,386,636.

If the plastic bags are to be used for comestibles or other products sensitive to contamination, bag sterilization is important. While container manufacturers can easily produce internally aseptic flexible plastic bags, those with attached unsealed fitments can readily become internally contaminated to possibly shorten the life or ruin the product to be contained therein. If internal bag contamination is an important consideration, the bag manufacturer can supply the bag webs with capped fitments. However, internally pre-sterilized bags with capped fitments must be sterilized externally around the cap and filling fitment in an aseptic chamber just prior to removal of the cap and the filling of the bag to ensure against contamination during filling in the filling chamber, and then replaced immediately after filling in an attempt to avoid damage or contamination of the product therein.

The flexible plastic bags made in accordance with the present invention are formed and then filled and sealed without use of such a filling fitment. By thus eliminating the filling fitment, exterior sterilization of a bag prior to filling is a simple and uncomplicated process in a sterilized chamber.

In the method and apparatus described herein, an internally presterilized plastic tube may be employed or, in a preferred embodiment, two identical webs of flexible, heat sealable plastic material may be sterilized before or after their joining in a conveyor where the

combined webs are heat sealed along the edges to form a tube. The tube thus formed is then heat sealed across the bag separation positions, punched along the edges so that the web can be drawn through the conveyor system by rotating sprocket wheels, and laterally perforated along the heat sealed bag separations. If desired, the web of bags thus formed may be removed from the conveyor and folded in a storage container for future use; or if desired, the web may continue along the conveyor to receive an optional dispensing fitment, such as that disclosed in our copending U.S. patent application Ser. No. 447,493, filed Dec. 6, 1982. The fitment is heat sealed to the exterior surface of each bag, and its attachment is followed by the cutting of a lateral filling slit through only one sheet of the plastic, the admission of the product through a nozzle introduced through the slit, and the heat sealing of the lateral filling slit to thereby seal the bag from leakage of the product and the admission of air or external contaminants. It is important to note that internal sterilization is preserved both in bags fabricated from individual plastic webs and in bags fabricated from presterilized plastic tubes, and the subsequent addition of an optional dispensing fitment to their exterior surfaces cannot affect their aseptic interiors. Further, the bags do not become contaminated between the period of time from the lateral filling cut to the actual filling through the nozzle and the resealing of the filling cut immediately following the withdrawal of the nozzle if these operations are conducted in a sterile chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings which illustrate the preferred embodiment of the invention:

FIG. 1 is a schematic drawing illustrating the various components in the forming and subsequent filling and sealing of flexible heat sealable plastic bags;

FIG. 2 is a sectional elevation view of the bag forming and perforating press taken along the lines 2—2 of FIG. 1;

FIG. 3 is a sectional elevation view of the bag forming press taken along the lines 3—3 of FIG. 2;

FIG. 4 is a view of a portion of a plastic bag web illustrating attached fitments and lateral filling cut through one surface thereof; and

FIG. 5 is a sectional view of a diving filling nozzle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 schematically illustrates the apparatus for forming flexible plastic fluid containers and for filling and sealing them against loss of the contents and against the admission of air or external contaminants. As illustrated in this figure, rolls 10, 12 contain supplies of a flexible plastic, the plastic in each roll preferably being a three layer material formed of a center layer of a strong flexible material such as Nylon that laminated to outer layers of a heat sealable material such as polyethylene. The plastic from each roll passes over spring biased web tensioning rollers 14, 16 and the surfaces hereinafter defined as the inner surfaces may be sterilized by a gamma irradiator 18. If preferred, a roll of presterilized flexible plastic tubing may be used to replace the separate rolls of plastic, and the interior sterilization of either may be preformed before or after formation of the bags.

In the embodiment of FIG. 1 the plastic webs, after passing before the irradiator 18, is pressed together by web straightening rollers 20, 22 which operate to press the two single plastic webs into a smooth combined web 24 prior to its edge and lateral sealing into individual sealed bags. If desired, a wide ribbon of a laminated hygroscopic/non-hygroscopic material such as a polyethylene/Nylon may be inserted between the webs before entering the web straightening rollers. As described and claimed in copending patent application Ser. No. 555,045, filed Nov. 25, 1983, such a ribbon will curl when the hygroscopic layer absorbs a liquid to form a curved semi-rigid strip which will prevent the bag from collapsing as the liquid product is dispensed therefrom. If an optional dispensing fitment is to be heat bonded to the bag outer surface, it is desirable to bond a patch of laminate composed of a high melting material such as Nylon and low melt material such as polyethylene on one side to the interior surface at the location of the fitment so that the heat bonding of the fitment will not also bond together the two sides of the bag.

The smoothed combined web 24 passing through the web straightening rollers 20, 22 is drawn into a sealing and perforating press 26 shown in greater detail in the sectional drawings of FIGS. 2 and 3. The press 26 heat seals while punching a series of equally spaced sprocket holes along both side edges, and preferably simultaneously heat seals and perforates laterally across the web to form a web of completely edge sealed plastic bags which may be separated into individual bags by tearing the lateral perforations.

Referring now to the detailed sectional drawings of FIGS. 2 and 3, the sealing and perforating press 26 includes a solid metal base unit 28 having suitable holes in the top surface for receiving guide rods 30 and the several sprocket hole punches 32 along the edge. The combined web 24 rests upon the top surface of the base unit and is advanced after the web has been heat sealed and punched. Overlying the base unit 28 and vertically moveable by pneumatic actuators 33 is a punching and sealing unit 34. Unit 34 is rectangular in plan with dimensions determined by the desired dimensions of the web 24 and the sealed bags being made therefrom and preferably is formed as a metal frame that is hollow in the center with an overlying cover plate 36 as shown in FIG. 2. The guide rods 30 extend through the frame portion up to the overlying cover plate 36 and holes 38 around the lower surface and parallel thereto carry electrical heating elements that operate to heat seal together the laminates forming the web 24 when the actuators 33 forces down the punching and sealing unit 34 against the web 24 and base unit 28. As will be subsequently discussed, the sealing unit 34 preferably seals arcuate inside corners in the web.

The hollow frame portion of the punching and sealing unit 34 contains a rectangular groove along the longitudinal edges and in the top surface for receiving a punch mounting bar 40 that extends substantially the full length of the frame portion. The vertical dimension of the bar is less than that of the rectangular groove so that the bar, which is attached to the actuator rods 42 of the pneumatic actuators 33, may be moved vertically within the rectangular groove and up to the lower surface of the plate 36 which covers the groove. As best shown in FIG. 3, a plurality of sprocket hole punches 32 are threaded into the lower surface of the bar 40 and extend through holes in the frame member and into clearance holes in the base unit 28 of FIG. 2. Thus,

when the pneumatic actuators 33 extend their actuator rods 42, the bars 40 press down on the lower surface of their grooves to force the punching and sealing unit 34 down to both heat seal the edge of the web and punch a line of sprocket holes along that sealed edge. When the actuators 33 start to lift, the bar 40 is first lifted to disengage the attached the punches 32 from the hot web 24 and when the top of the bar contacts the lower surface of the cover plate 36 the entire punching and sealing unit 34 is raised to release the sealed and perforated web.

As shown in FIG. 3 the leading end of the punching and sealing unit 34 contains the lower edge holes 38 for a heating element that laterally seals across the web to form sealed bags. Attached to or formed in the lower leading edge of the unit 34 is a saw toothed perforator blade 44 which forms perforations laterally across the sealed web 24 to facilitate the separation of the web into individual bags. As mentioned earlier, it is preferable that the web 24 is sealed with arcuate inside corners so that the sealed and perforated web 24 will appear as shown in FIG. 4. In addition to the important advantage of reducing corner stresses and of providing additional strength to the corners of the finished sealed plastic bag, the sealed curved corners aid in maintaining bag cleanliness by preventing small portions of the bag contents from becoming embedded the corners.

As shown in the schematic drawing of FIG. 1, the perforated, sealed and sprocket hole punched web of plastic bags now passes over a power rotated sprocket wheel 46 that draws the web 24 through the smoothing rollers 20, 22 and through the sealing and perforating press 26 in intermittent rotations that permit the web to remain in the press 26 for the two or three seconds necessary to thoroughly seal the web.

When the web has passed from the sprocket wheel 24 it is a completely sealed, sprocket punched, and laterally perforated strip of interconnected bags that may, if desired, be removed from the apparatus, fan-folded, and boxed for future use, as shown in FIG. 1. In the preferred embodiment, however, the web 24 is looped at 48 and brought over a second sprocket wheel 50 and upon the flat top surface of a base unit 52.

An auxiliary conveyor supplies optional flanged bag-piercing type dispensing fitments to a pneumatically actuated fitment press 54 which is lowered to seal a fitment 56 to the exterior surface of each sealed bag in the web 24. The fitment press 54 is actuated at a correct timing that will attach the fitment to the end of each bag that will be the lower end when the bag has been filled and placed in its permanent shipping and dispensing box.

The web is then advanced into a sterilizable chamber 55 which contains a gamma ray radiator and which also may be further flushed and sterilized by the admission into the chamber of a low pressure aseptic gas which is permitted to escape in the entry and exit areas around the web of bags. Within the chamber 55 is a cutter 58 which is carefully adjusted to cut either a lateral arcuate or straight slit 60 of about three inches in length through only one side of the bag web at a location in each bag at the end opposite to the location of the fitment, as shown in FIG. 4. Single layer cutters such as the cutter 58 are in common use in, for example, the cutting of adhesive paper labels attached to a backing sheet. The cutting of the slit 60 in only one of the two sides will open the bag but because it is within the sterilizing chamber 55, the bag is not subject to contamination.

After each bag has received its slit 60, the sprocket holes in the web pass over another sprocket wheel 62 operating in conjunction with the wheel 50. The web 24 is lowered from the wheel 62 so that it hangs from its sprocket holes and, in thus turning downward, the slit 60 slightly opens as shown in FIG. 1. While the opening may be somewhat small, it is adequate to permit the entrance of a pointed diving nozzle 64 which may fill the bag from the bottom up, as will be subsequently described. After the bag has been filled, the sprocket wheel 62 immediately advances the open slit to a sealing press 66 which comprises heated elements that are pressed together from both front and rear of the bag in the area surrounding the slit to heat seal together the two plastic laminates forming the bag. The filled and sealed bag is then passed from the sterilizing chamber 55 to an output conveyer 68 and from the apparatus of the invention.

The preferred embodiment of the diving nozzle 64 is illustrated in detail in FIG. 5 and includes within a housing (not shown) a pointed pen shaped nozzle tip 70 that is positioned in close proximity and substantially tangent with the surface of the web as it is bent over the sprocket wheel 62 of FIG. 1. The tip 70 is longitudinally moveable along the tangent and is positioned to enter the small opening in the bag that is provided by the slit 60. As shown in FIG. 5, the tip 70 is at the end of a tube 72 which extends into and from the opposite end of a stationary cylinder 74 having pneumatic openings 75, 76 at each end thereof. The tube 72 has an external coaxial piston 78 within the cylinder 74 so that the tube will longitudinally travel in accordance with the application of pressure into one of the openings 75 or 76. As shown in FIG. 5 the tube 72 is extended from the cylinder 74 as if pressure had been applied to the opening 75.

When the tip has entered the slit 60 in a bag the bag opening is enlarged by the extension of the tube further into the bag. At this point a filling tube 80 within the tube 72 and coaxial therewith is extended from the tip and deep into the bag and near its bottom so that the surface of the contents cannot bubble or form a "head" and, even more important, to keep the contents clear of the slit so that the subsequent application of heat to seal the opening will not burn or scorch any heat sensitive contents or permit it to adhere to the surface of the heat sealing press 66.

The coaxial filling tube 80 extends through the length of an elongated cylinder 86 that is attached to the interior end of the diving nozzle tube 72 and thereby moves longitudinally with the movement of the tube 72 and its tip 70. The filling tube 80 has an external coaxial piston 82 which, upon the application of pressure to either of the openings 83, 84 in the cylinder 86 drives the filling tube the length of its moveable cylinder and thus the filling tube reaches deep into the bag to be filled. The filling tube 80 extends out from the top end of the cylinder 86 and is attached to a source of the product that is to fill the bags in the web.

It will be noted that the contents of a filled and sealed bag are protected against leakage from the bag and also against the admission of air or contaminants. This greatly extends the shelf life of bulk packages juices, wines, and granular products that may be packaged in flexible plastic bags for future dispensing by piercing the bag surface within the tubular fitment by a suitable dispensing tap attached thereto. It should also be noted that the steps of edge sealing, cross-sealing, cross-perforating, and sprocket hole forming may, is desired, be

performed by separate steps or a combination thereof, and that the attachment of a dispensing fitment to the bag surfaces is an optional step that may be eliminated, if desired. Therefore, the invention herein is to be limited only by the appended claims.

What we claim is:

1. A method for forming a web of series connected, flexible container bags from two elongated sheets of heat sealable plastic material, and for filling and sealing said bags, said method comprising the steps of:

placing the first surface of a first one of said elongated sheets against a corresponding first surface of a second one of said sheets;

heat bonding together said first and second sheets in a longitudinal strip along the edges of the joined elongated sheets to form a tubular web;

heat bonding said first and second sheets in lateral strips across said tubular web in a pattern defining a container bag, and forming a line of lateral perforations through said lateral strips for separating bags from said tubular web;

forming a line of sprocket holes along each heat bonded longitudinal strip of said tubular web, said sprocket holes being engagable with the sprockets on a rotatable sprocket wheel;

advancing said web, the first end of each bag leading the second end thereof, to a slitting station where a lateral slit is cut through a portion of the first plastic sheet of each container bag in said web at a location adjacent the second end of the bag;

passing the longitudinal sprocket holes in said web of bags over and around a sprocket wheel to bend said web to a position at which the lateral slit will cause the first plastic sheet to separate from said second plastic sheet to form an opening into the interior of a bag;

filling said sprocket wheel suspended bag through said opening; and

heat sealing together the first and second plastic sheets in the area of said opening.

2. The method claimed in claim 1 including the additional step, following the step of forming a line of sprocket holes, of:

drawing said web to a fitment attachment location, and bonding a dispensing fitment to an exterior surface of each individually defined bag in said web at a location adjacent the first end of said bag.

3. A method for forming a web of series connected flexible container bags from an elongated tube of heat sealable plastic material having first and second sides, and for filling and sealing said bags, said method comprising the steps of:

heat bonding together a longitudinal strip along the edges of the first and second sides of said elongated tube;

heat bonding together said first and second sides in lateral strips across the plastic tube in a pattern defining a container bag;

forming a line of sprocket holes along each heat bonded longitudinal strip, said sprocket holes being engagable with a rotatable sprocket wheel;

advancing the web of bags to a slitting station and cutting a lateral slit through the first side of each container bag at a location corresponding to the lagging end of each bag in said advancing web;

hanging said web of bags by its sprocket holes over a sprocket wheel and passing said web around the wheel so that the lateral slit is located in a position

that will cause the first side of each bag to separate from the second side and thereby open said slit; filling each bag in said web through the opened lateral slit; and

heat sealing together the first and second sides of each bag at said slit.

4. Apparatus for forming a continuous web of plastic bags from at least two supply sources of heat sealable plastic material, for filling said bags with a product, and for sealing the filled bags, said apparatus including:

a sealing press having a substantially planar surface formed with longitudinal and lateral heatable strips defining the shape of the plastic bags;

a base unit having a substantially planar surface positioned adjacent and substantially parallel to the planar surface on said press;

power means for moving the surfaces of said press and said base unit toward and from each other;

a perforation cutter extending from at least one lateral end of said sealing press surface;

a plurality of sprocket hole punches equally spaced substantially along the center of each longitudinal heatable strip;

a power rotated sprocket wheel having sprockets for engaging sprocket holes produced by sprocket hole punches and for drawing the flexible plastic material from the respective supply sources into position between said press surface and said base unit surface;

means for bonding a dispensing fitment to an exterior surface adjacent a first end of each bag defined by the longitudinal and lateral heat bonded strips in said web;

cutting means for cutting a lateral slit across a portion of the first plastic sheet of each bag at a location adjacent the second end of said bag;

sprocket means for engaging the sprocket holes in said web and for bending said web so that the lateral slit in the first plastic sheet of each bag will separate from the second sheet to form an opening into the interior of each bag;

filling means for entering said opening and for filling each bag; and

sealing means for heat sealing together the first and second sheets of each bag at the location of said opening.

5. Apparatus for opening, filling and sealing pre-sealed, flexible, heat sealable, plastic bags formed in a continuous web of bags, said web of bags including a longitudinal strip along each edge of said web, said strip having sprocket holes thereon, said apparatus comprising:

cutting means for cutting a lateral slit across a portion of one sheet of plastic in each bag at a location to be the top end of a filled bag in the web;

means for bending said web in a direction away from said lateral slit and for suspending said bag with said lagging end above the leading end thereof and at a point at which said laterally located slit will separate from the corresponding interior surface of the opposite unslitted plastic sheet of the bag to form an opening into said bag;

said means for bending including a pair of spaced sprocket wheels for engaging the sprocket holes in said strip and around which said strip passes for bending said strip and for suspending said web at a point at which said lateral slit will open to form an opening into said bag;

filling means having a pointed end positioned to enter said opening formed by said slit; and

heat sealing means positioned adjacent each surface of said bag, said heat sealing means being positionable against said surfaces over said slit for heat bonding together the plastic sheets of said bag to thereby reseal the bag.

6. The apparatus claimed in claim 5 wherein said filling means comprises a first tube having a pointed end for entering said opening, said first tube being movable along an axis substantially parallel with said bag, said filling means further including a second tube within said first tube and coaxially moveable therein, the end of said second tube being extendable from the pointed end of said first tube to a position near the lower end of said bag, said second tube being attachable to a source of product that will fill said bag from the lower end thereof.

7. The apparatus claimed in claim 5 wherein said web of bags includes a longitudinal strip along each edge of said web, said strip having sprocket holes thereon, and wherein said means includes a pair of spaced sprocket wheels for engaging the sprocket holes in said strip and for suspending said web at a point at which said lateral slit will open to form an opening into said bag.

* * * * *



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United States Patent [19]

Arzuman et al.

[11] Patent Number: **5,673,541**[45] Date of Patent: **Oct. 7, 1997**[54] **APPARATUS AND METHOD FOR FORMING, FILLING AND SEALING A BAG**[75] Inventors: **B. John Arzuman**, Scarborough;
Ronald Moroney, Woodbridge, both of
Canada[73] Assignee: **Emplex Systems, Inc.**, Scarborough,
Canada[21] Appl. No.: **550,776**[22] Filed: **Oct. 31, 1995**[51] Int. Cl.⁶ **B65B 43/30; B65B 43/04**[52] U.S. Cl. **53/459; 53/469; 53/284.7;**
53/570[58] Field of Search 53/455, 459, 562,
53/570, 384.1, 373.6, 374.8, 469, 468,
284.7; 493/195, 229, 232, 234, 237, 238[56] **References Cited****U.S. PATENT DOCUMENTS**

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Reduce Your Packaging Costs with the Simple. High-Speed
Autobag H-100 Packaging System.*Primary Examiner*—Horace M. Culver
Attorney, Agent, or Firm—Darby & Darby[57] **ABSTRACT**

An apparatus for forming, filling and sealing a pre-formed bag has a top sheet and a bottom sheet. The bag has a leading edge seal, a trailing edge seal, a bottom edge seal and an open top edge with an upper portion extending therefrom. The apparatus includes a back plate, a slotted front plate disposed adjacent to the back plate. The slotted front plate and the back plate clamps a portion of the bag disposed below the top edge. The front and back plate extend from the trailing edge to the leading edge. A pair of gripping fingers clamp the leading edge and the trailing edge adjacent to and below the front plate. A pair of pins each have a distal end that moves from a first limit position to a second limit position. In the first limit position, the distal end of the pins are spaced from the bottom sheet. In the second limit position, the distal end of the pins penetrate through the bottom sheet and clamp the top sheet against the front plate.

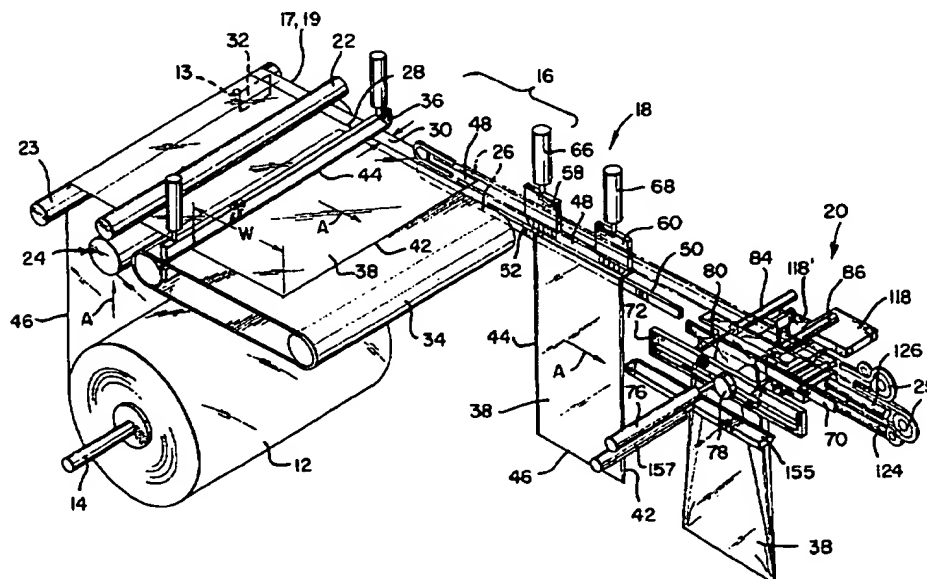
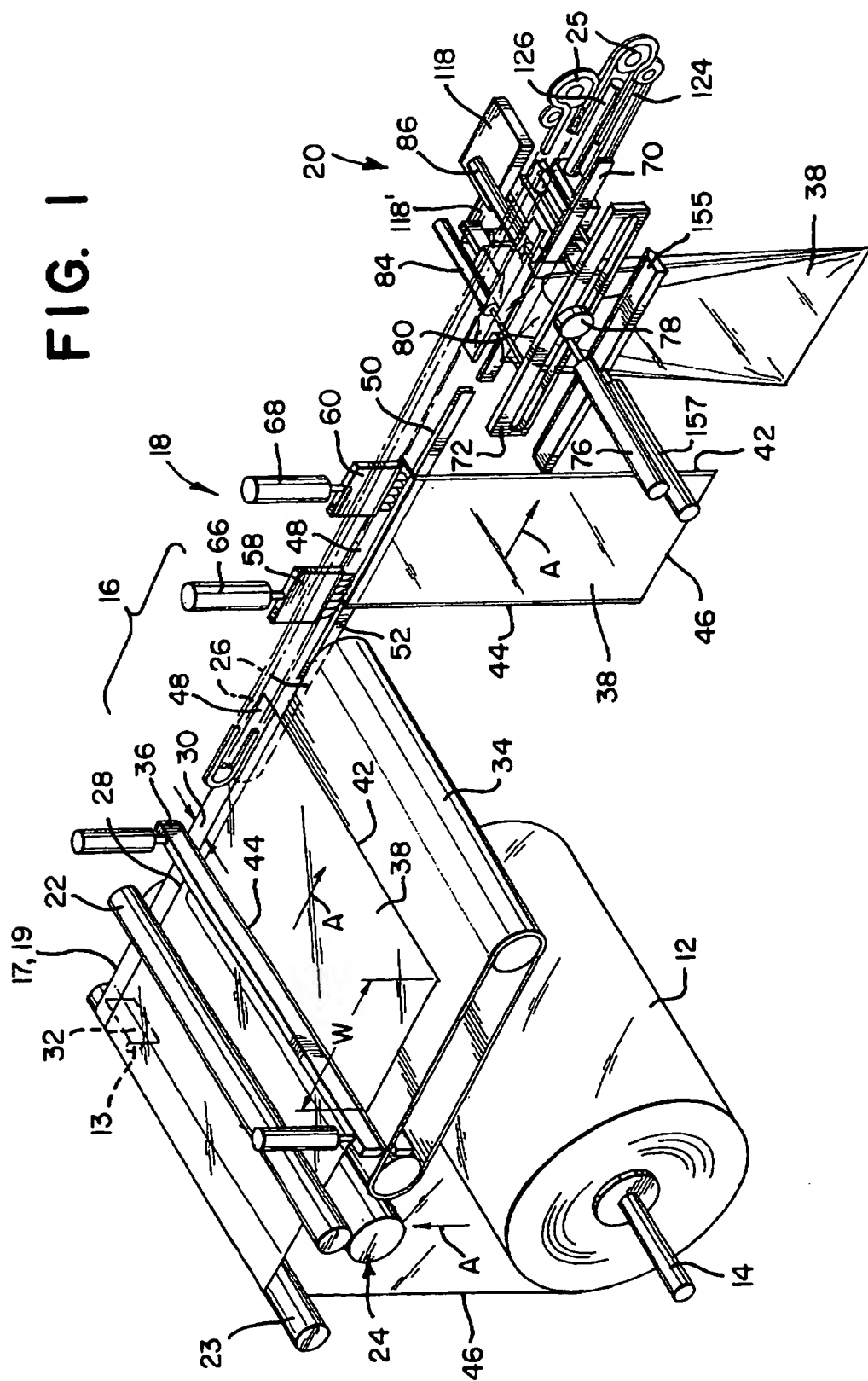
25 Claims, 10 Drawing Sheets

FIG. 1



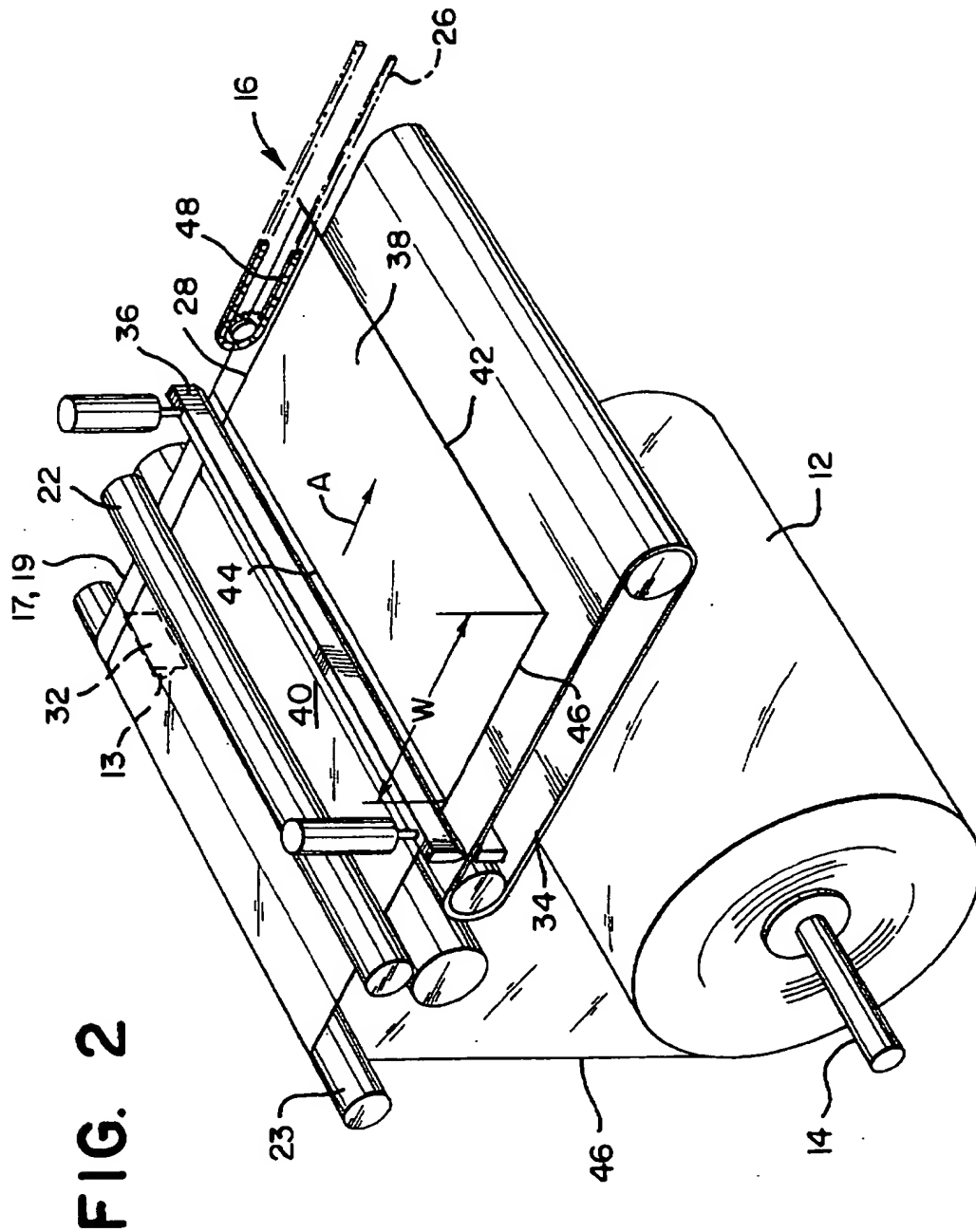
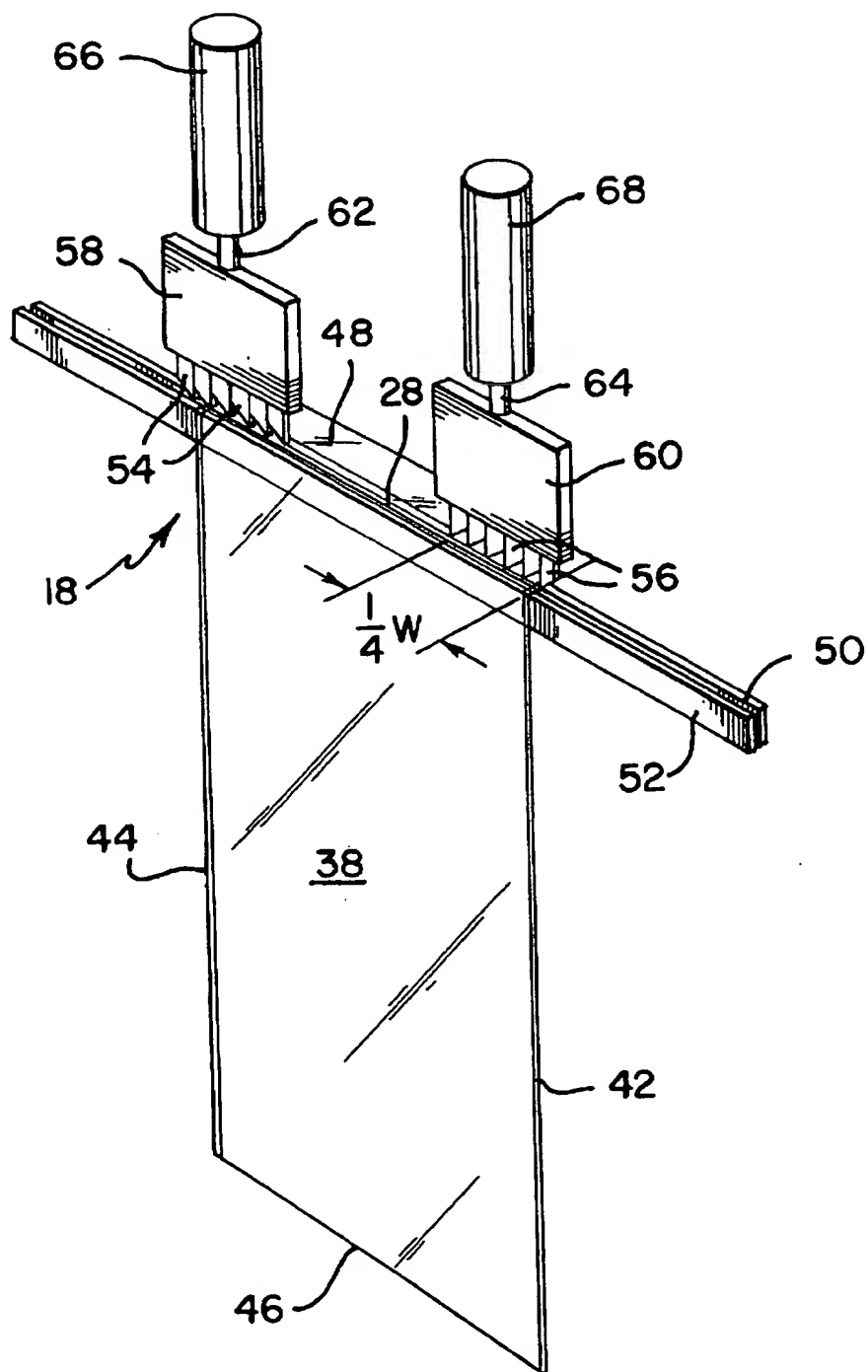


FIG. 3

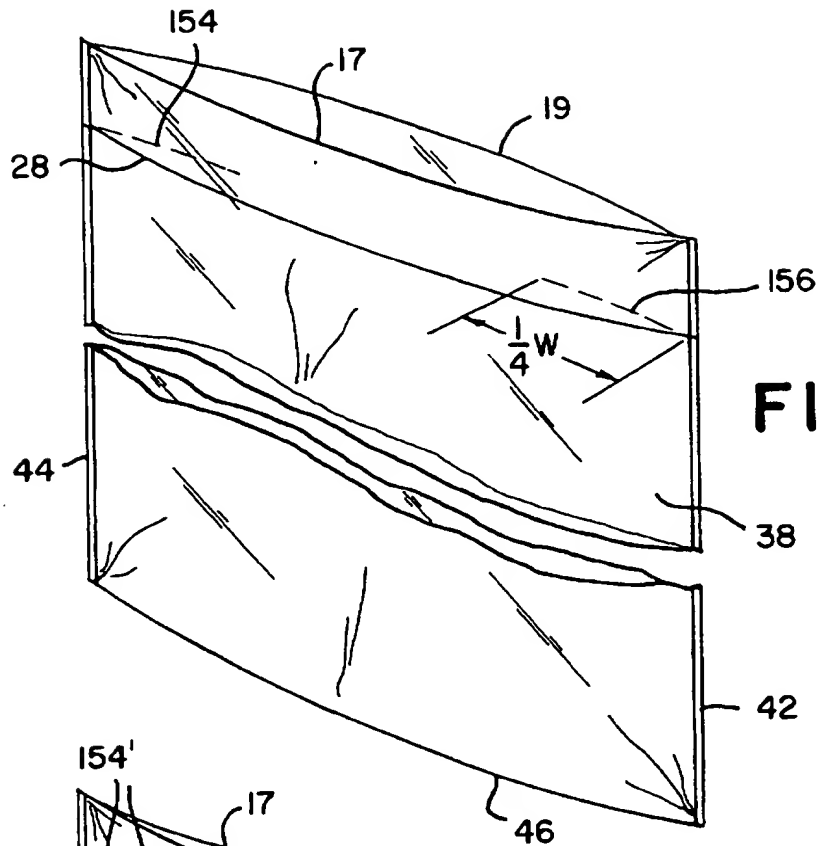


FIG. 4

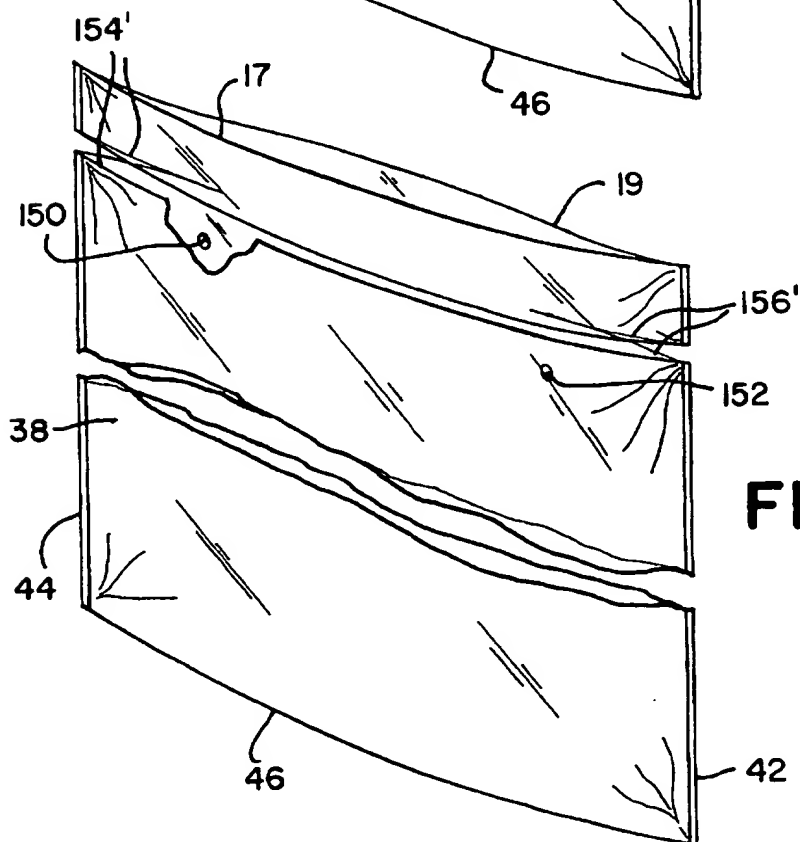


FIG. 12

FIG. 6

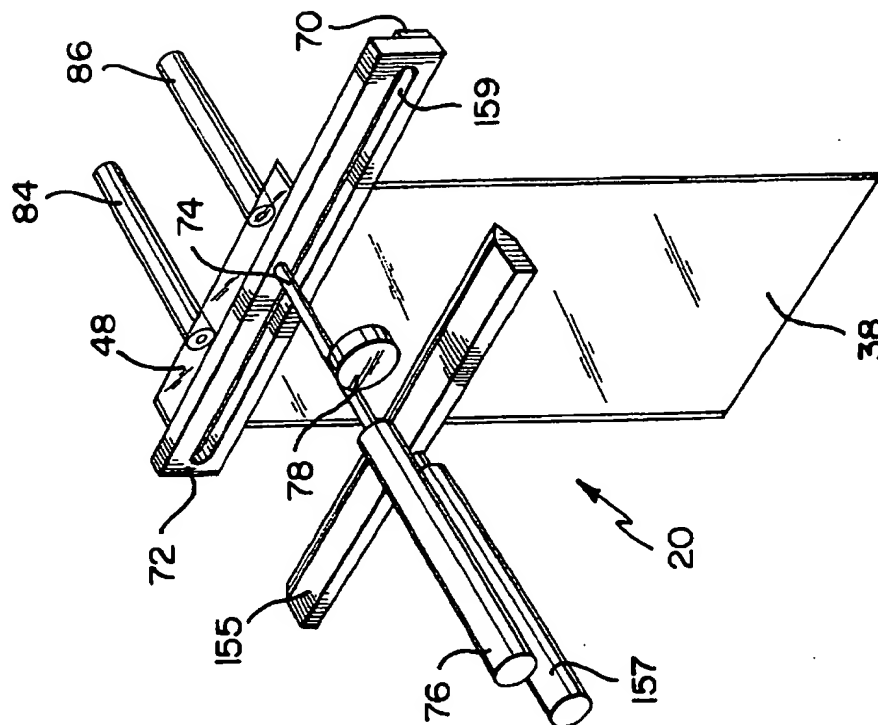


FIG. 5

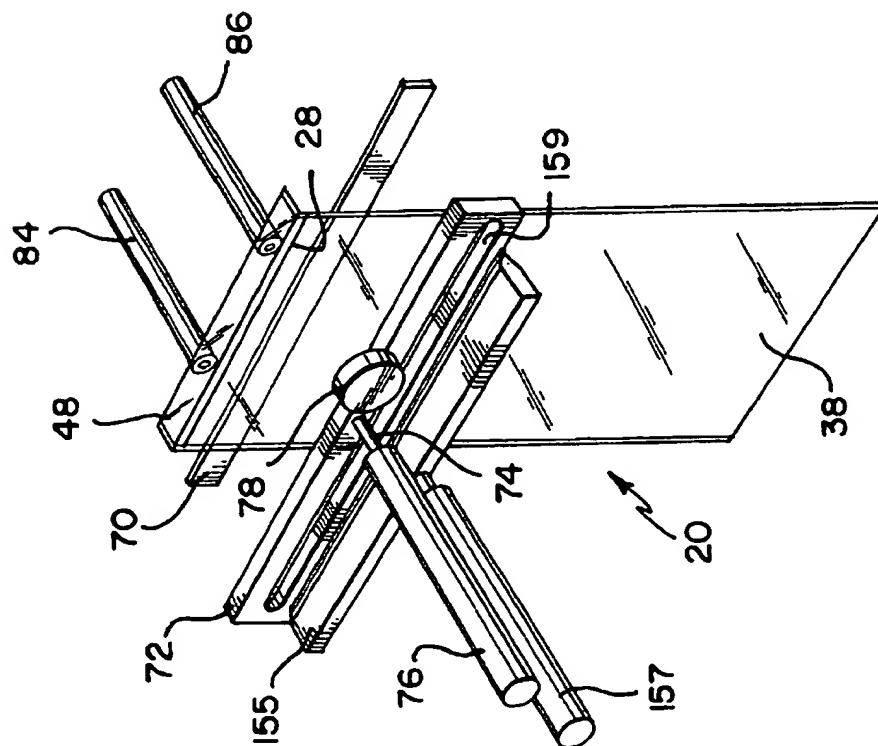


FIG. 8

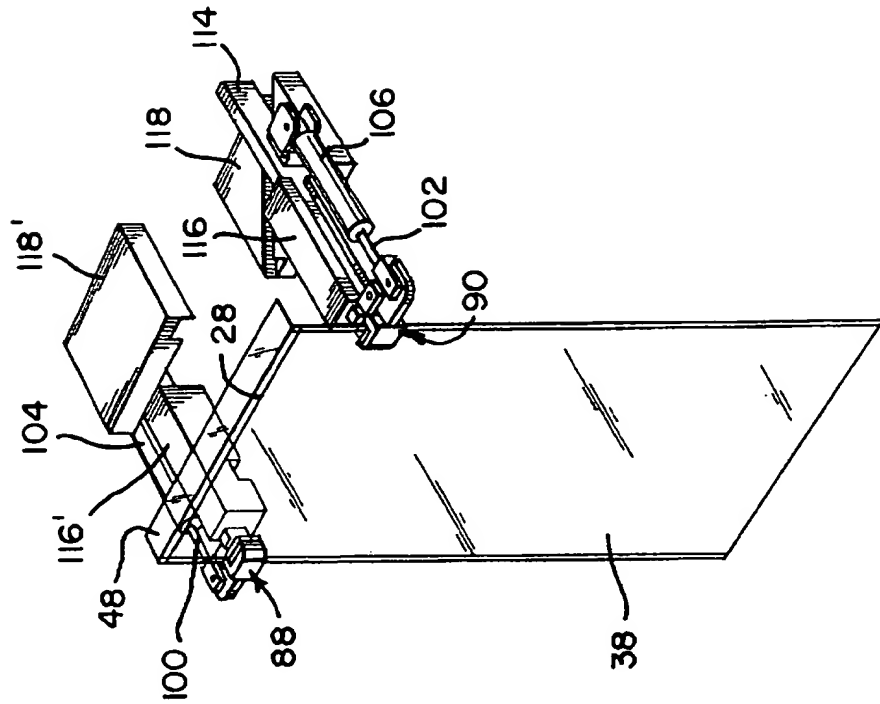
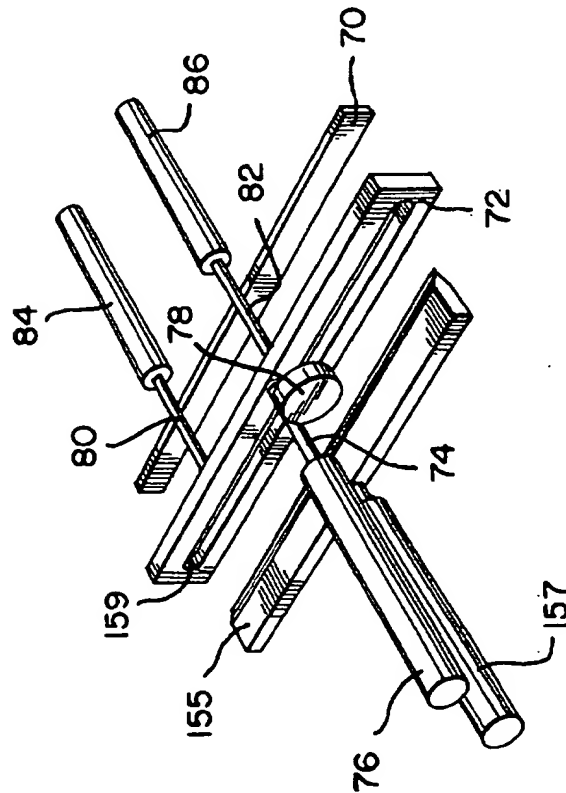
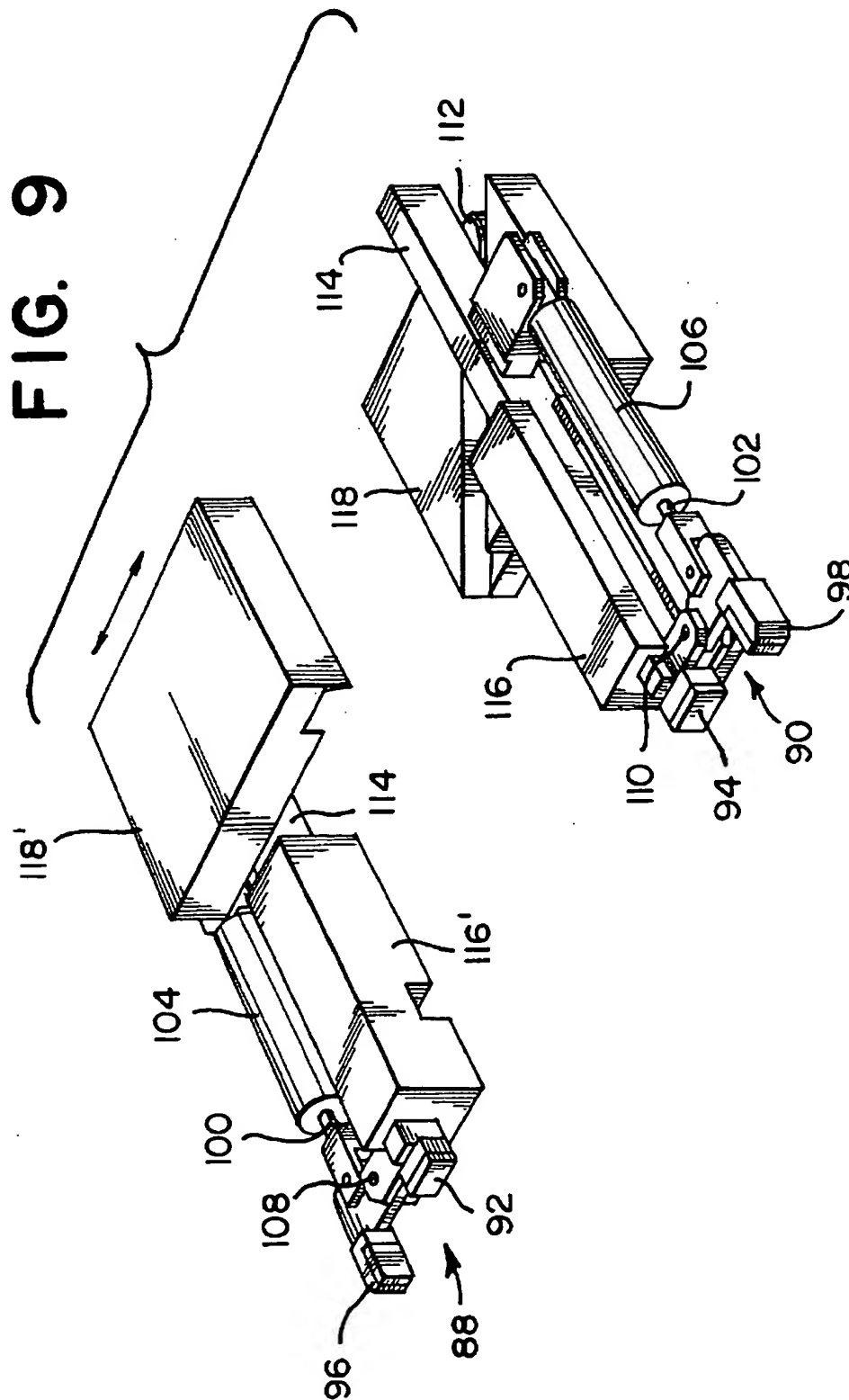


FIG. 7





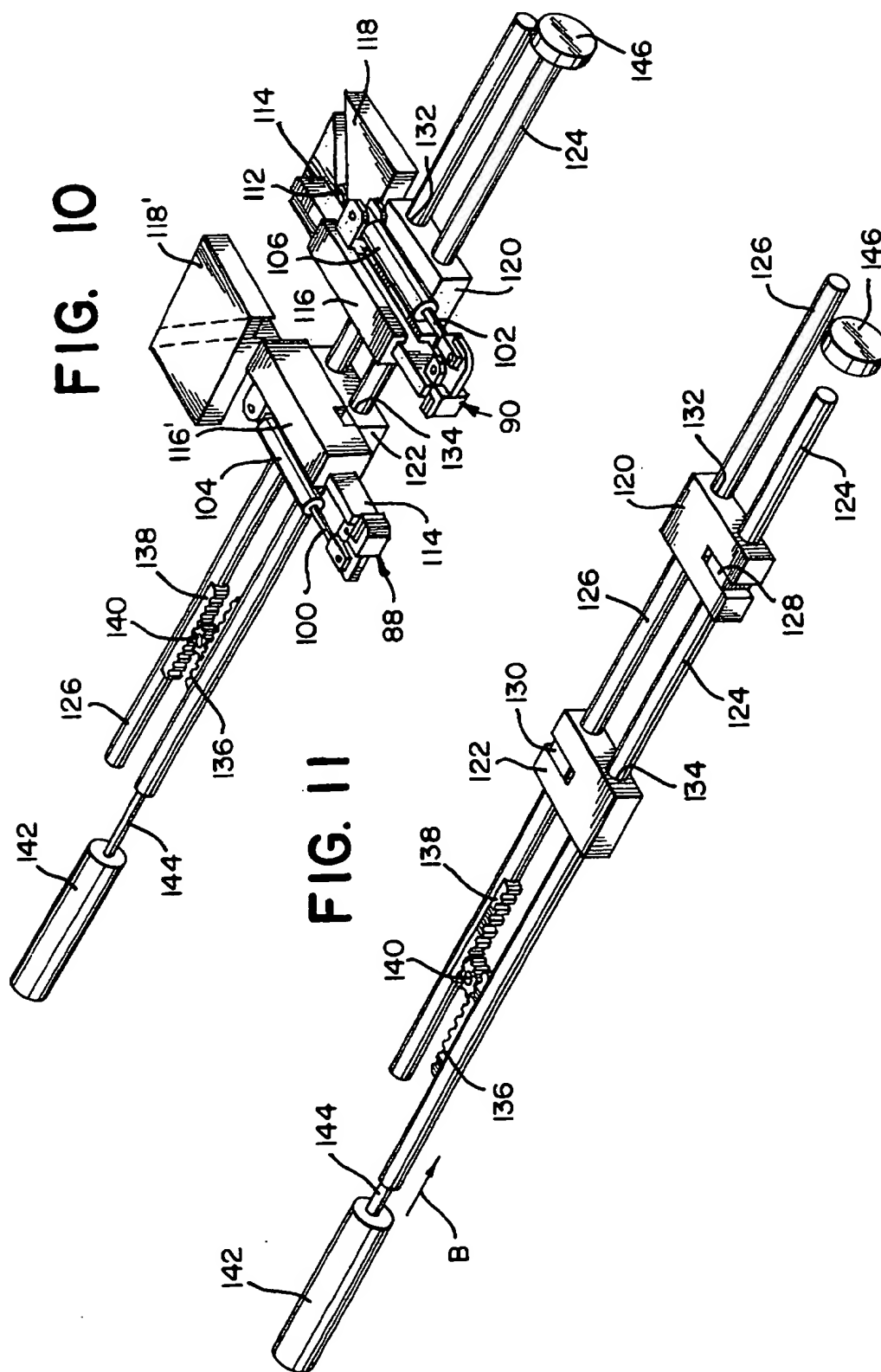


FIG. 13

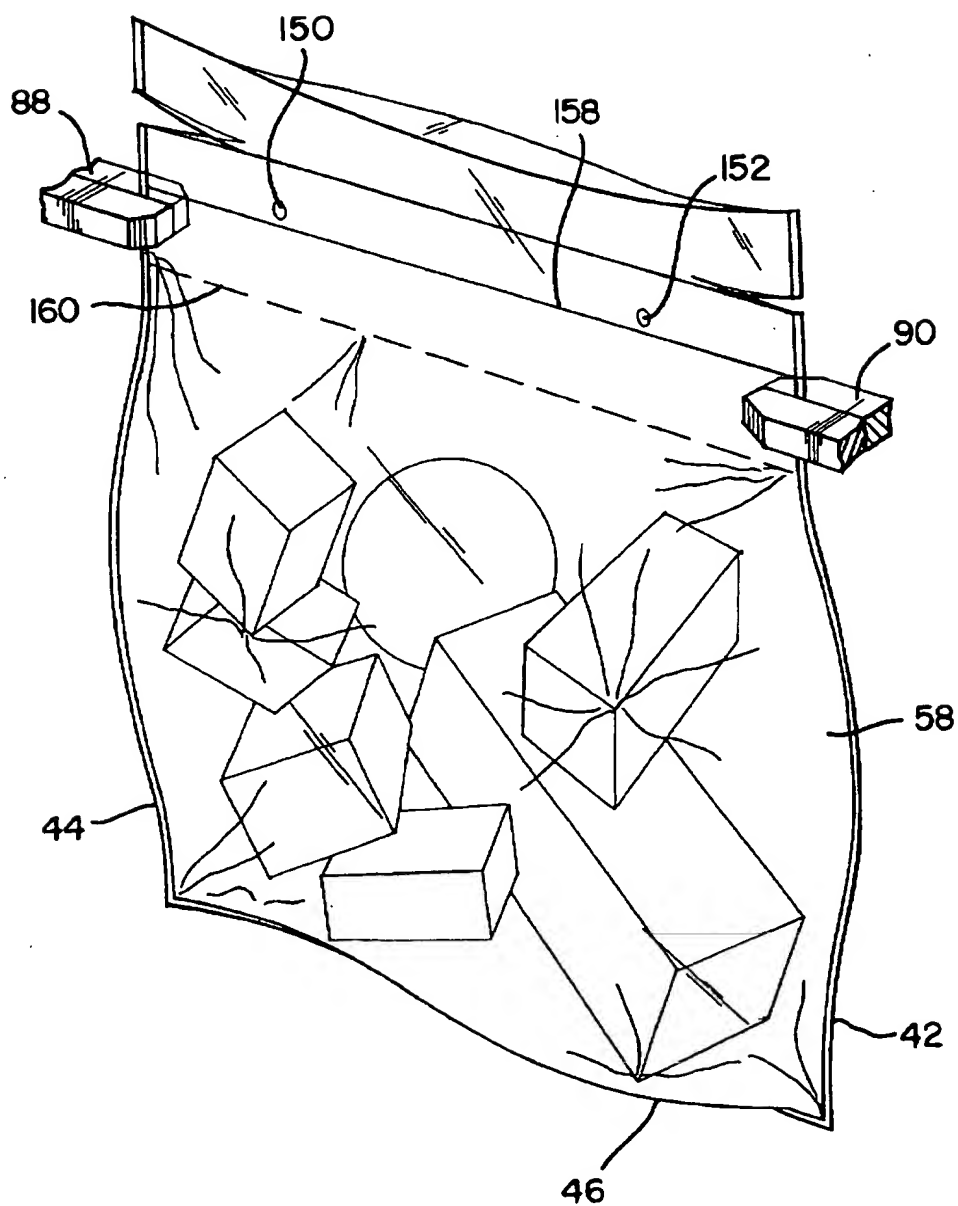
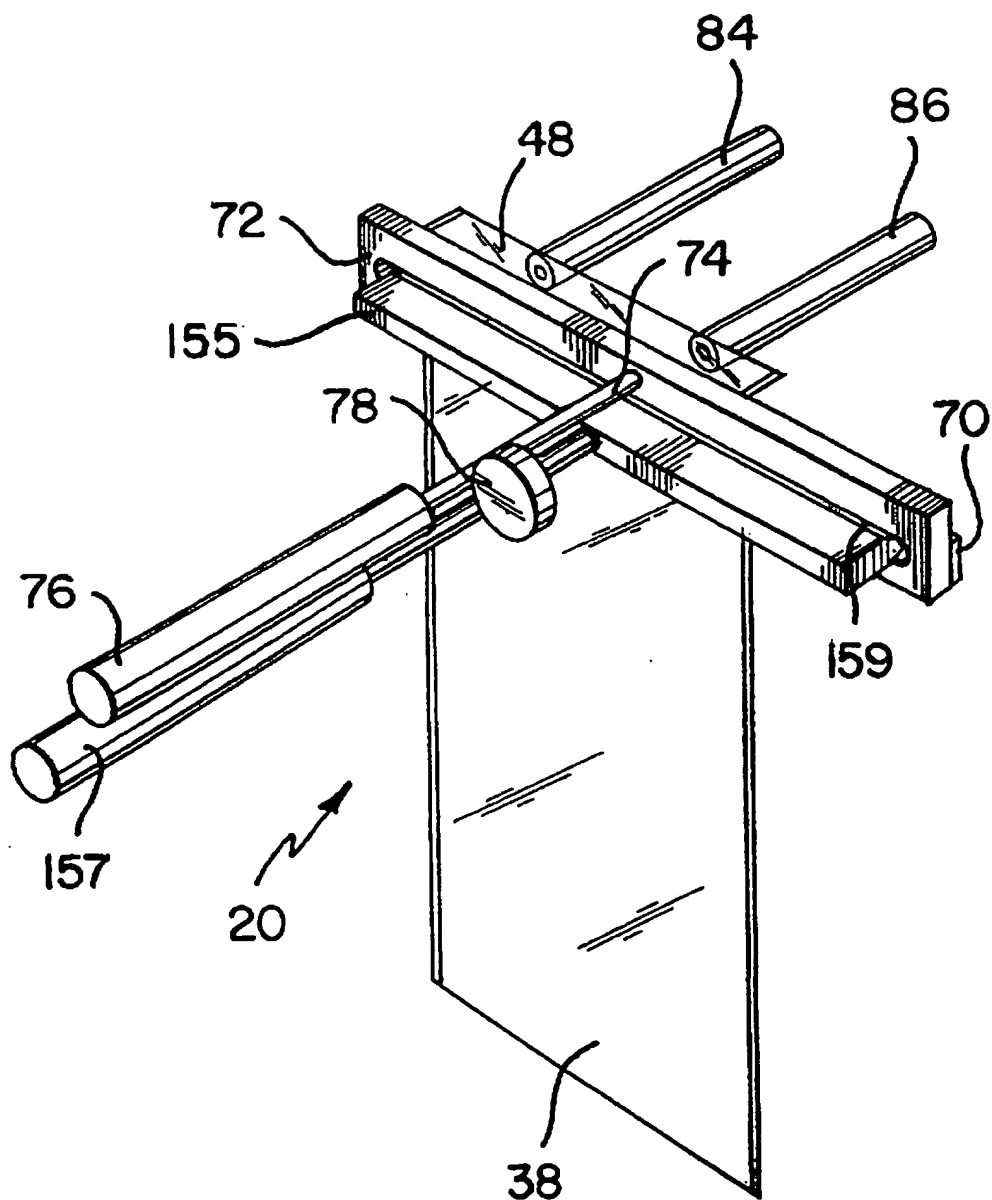


FIG. 14

APPARATUS AND METHOD FOR FORMING, FILLING AND SEALING A BAG

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to methods and apparatuses for forming, filling and sealing a bag.

2. Discussion of the Related Art

It is generally known to use plastic film as a packaging material in the form of bags, pouches or a wrap. For example, U.S. Pat. No. 4,546,956 to Cherney discloses an apparatus for forming, filling and sealing packages in which a pouch is formed from a single web of flat flexible film. The film is fed from a roll over a collar shaped device that forms the film into a tube around a product filling tube T. The two film edges are then sealed together. As the tube moves down through the machine, two horizontal sealing bars come together to form a heat seal which forms the bottom of the pouch. At that point, a predetermined amount of product is allowed to flow through the product filling tube T and into the just formed pouch. By the time the pouch is filled, the top of the pouch has traveled down to the sealing bar location S where the bars 17a, 17b once again meet to simultaneously create the top seal of the bag and the bottom seal of the next pouch thereabove. The sealing bars 17a and 17b are equipped with a knife 71 which cuts through the seal and thus separates the filled pouch from the machine. This type of machine requires highly skilled maintenance personnel to reload or adjust the machine when the package size needs to be changed to suit a product having a different size. Accordingly, this type of system is most effective in dedicated, high speed, high volume packaging applications, where the same size product is always packaged.

Another apparatus for packaging material is taught by U. S. Pat. No. 4,253,292 to Lipes which utilizes a supply of wicketed bags 11'. The bags 11' are located in the unit in a vertical configuration and are held in the machine by wicket pins 12. The bag opening means 21 includes an air jet 36 which is positioned adjacent to the mouth opening 15 of the bag. The air jet 26 is actuated to open the top of the bag so that the product may be loaded into the bag. Once the bag is opened, an insert end portion 37 of a retractor member 38 is positioned within the opening 15. After the predetermined quantity of a product is inserted within the bag 11, the bag is released and is free to fall due to the force of gravity. The loaded open bag is dropped onto a platform which activates a heat seal bar to close the top of the package. This type of system does not produce a very neat finished package due to the occasional misalignment of the bag as it drops into the sealer. This results in a crooked or wrinkled bag closure, which detracts from the appearance of the finished package. Additionally, this type of system is best suited for contents which tend to be flat, regularly shaped objects rather than loose or bulky objects.

Another system presently utilizes a "bag on a roll" and is currently available as a model H-100 Auto Bag, which is a product of Automated Packaging Systems of Streetsboro, Ohio. This type of machine utilizes a roll of pre-fabricated bags which are mounted on a spindle in the machine. The bags are fed to a fill station where they are opened under a filling chute. The bags are then filled either manually or automatically. Upon completion of the filling cycle, the machine activates a sealer which closes the bag and separates the package at the perforation line from the main roll of bags. Thereafter, a new bag is indexed and is opened under the filling chute. A problem with this type of system

is that the user is required to use pre-fabricated "bags on a roll" to utilize this machine. Thus, the user is required to utilize relatively expensive bags to operate this machine. Thus, there is a need in the art to produce a new forming, filling and sealing machine which utilizes low cost packaging material.

It is a further object of the present invention to provide a form, fill and seal machine that produces bags in an infinite range of bag sizes.

It is a further object of the present invention to provide a machine that loads the bag in a "top open" configuration when ready for filling.

It is a further object of the present invention to permit the bag to be filled by either a manual or automatic filling device.

It is a further object of the present invention that the machine be capable of sealing the filled package to produce a neatly finished package of the finest aesthetic quality.

It is a further object of the present invention that the form, fill and seal machine be capable of being operated by personnel having minimal training.

It is a further object of the present invention that the machine be ruggedly constructed and extremely reliable while also being compact and easily mobile.

It is a further object of the present invention that the machine operate at a reasonably high production rate.

It is a further object of the present invention to provide a form, fill and seal machine that requires less parts and, thus, is smaller and easier to manufacture.

It is a further object of the present invention that the form, fill and seal machine be cost effective to manufacture, yet reliable and efficient to use.

SUMMARY OF THE INVENTION

In a preferred embodiment demonstrating features, objects and advantages of the present invention an apparatus and method for forming, filling and sealing a bag having a top sheet and a bottom sheet. The bag has a leading edge seal, a trailing edge seal, a bottom edge seal and an open top edge with an upper portion extending therefrom. The apparatus includes a back plate. A slotted front plate is disposed adjacent to the back plate. The slotted front plate and the back plate clamp a portion of the bag disposed below the top edge. The front and back plate extend from the trailing edge to the leading edge. A pair of pins each has a distal end that moves from a first limit position to a second limit position. In the first limit position, the distal end of the pins are spaced from the bottom sheet. In the second limit position, the distal end of the pins penetrate through the bottom sheet and clamp the top sheet against the front plate. The method includes positioning the preformed bag between the back plate and the slotted front plate. A portion of the bag disposed below the top edge is clamped between the front plate and the back plate. The leading edge and the trailing edge of the bag is clamped at a position adjacent to and below the front and the back plate with a pair of gripping fingers. The bag is opened by moving a pair of pins from a first limit position where the pins are spaced from the bottom sheet of the bag to a second limit position where the pins penetrate through the bottom sheet and clamp the top sheet against the front plate thereby forming an opening in the top of the bag.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and still further objects, features and advantages of the present invention will become apparent upon

consideration of the following detailed description of a specific embodiment thereof, especially when taken in conjunction with the accompanying drawings wherein like reference numerals in the various figures are utilized to designate like components, and wherein:

FIG. 1 is a perspective view of the form, filling and sealing apparatus according to the present invention;

FIG. 2 is a perspective view of the bag forming station according to the present invention;

FIG. 3 is a perspective view of the bag perforator station according to the present invention;

FIG. 4 is a perspective view of the bag having perforations in the back sheet;

FIG. 5 is a perspective view of the bag disposed between the front clamp and the back clamp;

FIG. 6 is a perspective view of the bag being clamped between the front clamp and the back clamp;

FIG. 7 is a perspective view of the bag piercing pins extending against the front plate without the bag being illustrated;

FIG. 8 is a perspective view of a bag being held by the gripping fingers;

FIG. 9 is a perspective view of the gripping fingers and their actuator assemblies;

FIGS. 10 and 11 are perspective views of the carriage shafts for the gripping fingers;

FIG. 12 is a perspective view of the bag after it has been pierced by the bag piercing pins;

FIG. 13 is a perspective of the bag after it has been filled with contents and is held by the gripping fingers; and

FIG. 14 is a perspective view of the bag as the top seal is being formed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, an apparatus 10 for forming, filling and sealing a bag is illustrated and includes a roll of U-folded film 12, a cutting member 13, a bag forming station 16, a bag perforator station 18 and a bag open, fill and seal station 20.

The roll of U-folded film 12 is rotatably mounted on a spindle 14. The U-folded film 12 is comprised of a sheet of plastic film that is folded in half such that it has a folded end 46 and open or free ends 17, 19. Accordingly, the roll of film 12 is "U-folded" film and includes a top sheet and a bottom sheet. The top sheet has an upper free end 17 and a lower folded end 46, and the bottom sheet has an upper free end 19 and a lower folded end 46, which is common with the folded end of the top sheet; it being understood that relative orientation adjectives such as "upper", "lower", "horizontal", "vertical", etc. are utilized herein to simplify the present description and are not intended to limit the orientation of the forming, filling and sealing apparatus when mounted for use. The free ends 17, 19 of the top and bottom sheet are substantially aligned with respect to each other because the sheet is preferably folded evenly in half. The U-folded film is unwound from the roll so as to travel along a predetermined path A which is, in pan, defined by an idle roller 23, driving feed rollers 22, 24 and in-feed chains 26.

Before reaching idle roller 23, the U folded film 12 passes by the cutter member 13 which cuts only the top sheet of the U-folded film to form a slit 28 in the top sheet. Slit 28 is disposed substantially parallel to the free end 17 of the

U-folded film and is spaced from the free end 17 by a predetermined first distance 30. In a preferred embodiment, distance 30 is approximately 1". However, this distance will vary depending, inter alia, upon the size of the U-folded film and the contents to be filled within the formed bag. To ensure that only the top sheet of the U-folded film is cut, a plate 32 is disposed between the top sheet and the bottom sheet in juxtaposed position with respect to the cutter member 13. Plate 32 is positioned to prevent cutter member 13 from contacting the bottom sheet.

After passing the cutter member 13, the U-folded film 12 is then deflected by idle roller 23 to the driving rollers 22, 24 feed the film 12 to the bag forming station 16. Film 12 is supported in the bag forming station 16 by a horizontal conveyor belt 34. The driving rollers 22, 24 intermittently feed a predetermined amount of film 12 into the bag forming station 16 and then a brake is applied to the driving rollers 22, 24 to stop the further feeding of the film 12. The length of the film 12 which is fed into the bag forming station 16 is equal to the preferred bag width W. The length of the bag depends directly upon the width of the roll 12 which is used. Therefore, if a longer length bag is required, then a wider roll should be used.

After moving to the bag forming station 16, heated cut/seal blade 36 then clamps down upon the film 12. Blade 36 extends from the free ends 17, 19 to the folded ends 46 in a direction substantially perpendicular to the feed direction A (i.e., perpendicular to the free ends 17, 19 and to the folded ends 46 of the film) to simultaneously produce the trailing side welded edge 44 of the current bag 38 and the leading side welded edge 42 of the next bag 40 (See FIGS. 1-2). The heated cut/seal blade member 36 itself is of conventional structure. The bag 38 is now comprised of a sealed leading edge 42, a sealed trailing edge 44, a folded bottom edge 46 and a slit open top edge 28 disposed in the top sheet. The folded bottom edge 46 provides a bottom edge seal for the bag.

At the top edge, the bag 38 is not sealed to provide access to the bag 38 in the downstream filling and sealing station 20. In the bag forming station 16, a top portion 48 of the bag is fed into meshing in-feed chains 26 at a predetermined distance from the free ends 17, 19, which is approximately half of the distance 30. Thus, in the preferred embodiment, the in-feed chains are disposed at approximately $\frac{1}{2}$ " from the free ends 17, 19 of the bag 38. The in-feed chains are intermittently driven by drive sprockets 25.

Bag 38 has effectively been transferred from a U-folded film into a J-folded film due to slit 28. The in-feed chains 26 grasp the top portion 48 of the bottom sheet as well as the top portion 48 of the top sheet disposed above slit 28. However, the portion of the upper sheet held by the in-feed chains is no longer needed and therefore one could simply start with a roll of J-folded film which has been previously cut at area 28. Such a film will not lie uniformly on a spindle, especially at the slit edge and it is therefore currently preferred to use U-folded film because it is easier to handle in this manufacturing step.

Once the trailing edge 44 is formed, bag 38 is transported by the in-feed chains 26 to the bag perforator station 18. As the bag 38 leaves the horizontal conveyor belt 34, the bag will hang vertically downwardly from the in-feed chains.

Referring now to FIG. 3, the bag perforator station 18 is illustrated. For the sake of clarity in the drawings, in-feed chains 26 are not illustrated in FIG. 3. In the bag perforator station 18, the top portion of the bag 48 is supported by the in-feed chains and by a spaced apart pair of film supporting

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plates 50, 52. The plates 50, 52 are disposed in alignment with the slit 28 in the top sheet so that as the bag 38 is draped over plates 50, 52, the slit is disposed between the two plates 50, 52. Once the bag 38 has reached the position illustrated in FIGS. 1 and 3, the feeding of the bag by the in-feed chains is stopped. A first plurality of cutting members 54 and a second plurality of cutting members 56 are disposed above plates 50, 52 and are aligned with the leading edge 42 and the trailing edge 44 of the bag, respectively. The plurality of cutting members or blades 54, 56 are each fixedly mounted to a blade holder 58, 60, respectively. Each blade holder 58, 60 is actuated in a downward direction by a pin 62, 64, respectively, which are each actuated by pneumatic cylinders 66, 68. The blades 54, 56 move from a position illustrated in FIG. 3 to a position in which they extend through the bottom sheet of the bag 38, and between plates 50, 52. In a preferred embodiment, the blades 54, 56 are approximately $\frac{1}{8}$ of an inch wide and the distance between each blade member is approximately 1 mm to thereby create the perforations 154, 156 in the bottom sheet (see FIG. 4). The length of the perforations 154, 156 on each side of the bag is preferably one-fourth the width W of the bag. Thus, when the bag is to be opened in the bag open, fill and seal station 20, the bag will open to a substantial square shaped opening. However, if a rectangular shaped opening is desired, the length of the perforations should be adjusted to be less than one-fourth of the width of the bag.

FIG. 4 illustrates the bag 38 after it has been perforated by blades 54, 56. The top sheet of the bag is illustrated having its slit 28; whereas the back sheet is illustrated as being perforated at a position that substantially aligns with and is parallel to slit 28. The front and back sheets are illustrated as being spaced apart from one another for the sake of clarity in illustrating the perforations 154, 156 and the slit 28. However, the front sheet and back sheet are more accurately illustrated as being in contact with one another in FIG. 3.

The blades 54, 56 do not perforate the front sheet because the blades 54, 56 penetrate through the slit 28 of the front sheet which is disposed about plates 50, 52. The back sheet is preferably perforated as opposed to simply being cut from each side edge so that during transport of the bag from the bag perforator station 18 to the bag open, fill and seal station 20, the bag is less likely to open if it were to "catch" air during transport. In other words, the bag is more likely to be unintentionally opened if it is exposed to a gust of air when the back sheet is completely cut, rather than being perforated. After the blades 54, 56 form the perforations, the pneumatic cylinders 66, 68 are actuated to retract the blade holders 58, 60 to their original position as illustrated in FIG. 3. The bag 38 is then ready to be transported to the bag open, fill and seal station 20.

Referring now to FIG. 5, upon receipt of the bag 38 in the bag open, fill and seal station 20, the bag is positioned so that it is disposed between a backup sealing strip 70 and a front slotted plate 72. The front slotted plate 72 is actuated forward (i.e., toward backup sealing plate 70) to clamp bag 38 between back plate 70 and front plate 72. The front plate 72 is preferably actuated by a pin 74, which is preferably actuated by a pneumatic cylinder 76. The upper portion 48 of the bag is supported in a horizontal position by the in-feed chains 26. The bag is draped over from the horizontal portion such that the slit 28 is disposed in the vertical portion of the bag 38 (i.e., the portion of the bag draping downwardly from the in-feed chains 26, see FIG. 5). Slit 28 is disposed above the front plate 72 and above back up plate 70, as illustrated in FIG. 5. The retraction of front plate 72 away from back plate 70 is limited by the position of an adjustable stop 78.

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Referring now to FIG. 7, the bag open, fill and seal station 20 is illustrated without bag 38 for the sake of clarity. A pair of pins 80, 82 are disposed behind back plate 70. Pins 80, 82 are disposed above backup plate 70 and are actuatable towards front slotted plate 72 by a pair of pneumatic cylinders 84, 86. Upon receipt of a bag within the bag open, fill and seal station 20, the slotted front plate 72 is actuated toward backup plate 70 by pin 74 to the position illustrated in FIG. 6.

Once the top of the bag has been clamped between plates 70, 72, a pair of gripping fingers 88, 90 (FIG. 8) clamp each side of the bag 38. The gripping fingers 88, 90 are disposed below the backup plate 70 and the front plate 72 as illustrated in FIG. 1. Referring now to FIGS. 8 through 11, each finger 88, 90 is comprised of a fixed finger clamp 92, 94 and a pivoting finger clamp 96, 98, respectively. The pivoting fingers 96, 98, are actuated by a reciprocating pin 100, 102, which are actuated by air cylinders 104, 106, respectively. Referring to FIG. 9, the pins 100, 102 are shown in the retracted position and the gripping fingers 88, 90 are shown in the open position. After the top of the bag has been clamped between the backup plate 70 and the front plate 72, the pneumatic cylinders 104, 106 are actuated such that the pins, 100, 102 move in the forward direction towards the front plate causing the pivoting fingers 96, 98 to pivot about pins 108, 110, respectively and thereby grip the leading and trailing edge of the bag 38 as illustrated in FIG. 8. The grippers position the bag in the fill station, support the bag during the ling operation and close the top of the bag tightly during the sealing operation. Each gripper also includes a cam follower 112 (the cam follower for the trailing edge gripper is hidden from view in FIGS. 8 and 9). Each cam follower is connected to a slide bar 114. The slide bar 114 reciprocates in a slide block 116, 116' by following an adjustable 45 degree angle cam 118. Thus, the slide bars 114 reciprocate in a horizontal direction perpendicular to the surface of the bag.

The slide block 116 for the leading edge gripper 90 is fixedly mounted on an adjustable carriage 120 (see FIGS. 10 and 11). Similarly, slide block 116' for the trailing edge gripper 88 is fixedly mounted on carriage 122. Carriage 120 is adjustably fixed to carriage shaft 124, whereas carriage 122 is adjustably fixed to carriage shaft 126. Each carriage 120, 122 includes a shaft locking collar 128, 130, respectively so that its position with respect to the shaft can be adjusted. The carriages in FIG. 11 are illustrated as having a minimum distance therebetween (i.e., corresponding to a bag open position). Carriage 120 includes a second through bore 132 which receives carriage shaft 126 to guide the reciprocal movement of carriage 120 so that carriage 120 will not be permitted to rotate about shaft 124. Likewise, carriage 122 includes a through bore 134 to guide the reciprocal movement of carriage 122 while not permitting carriage 122 to rotate about shaft 126. Shafts 124, 126 reciprocate in opposite directions by a mutual rack and pinion and cylinder 142. Shaft 124 includes a rack 136 and shaft 126 includes a rack 138. A common pinion gear 140 is disposed between the two racks. Pneumatic cylinder 142 includes a pin 144 that is connected to shaft 124. Upon actuation of pin 144 in the direction indicated by arrow B in FIG. 11, shaft 124 will move towards adjustable stop 146. Because of the rack and pinion, shaft 126 moves in the direction opposite arrow B thereby causing carriage 122 to move in the direction opposite arrow B. The distance the shafts 124, 126 travel is controlled by the position of adjustable mechanical stop 146 and is set according to the bag size.

Once the bags sides are gripped by the fingers 88, 90, the bag is ready to be opened. The bag is opened by simultaneously actuating air cylinders 84, 86 so that pins 80, 82 move towards the front plate 72, actuating air cylinder 76 so that pin 74 retracts causing front plate 72 to retract, and actuating air cylinder 142 so that pin 144 moves in the direction opposite arrow B thus causing carriages 120, 122 to move towards one another. During the initial forward actuation of pins 80, 82, the top portion 48 of the bottom and top sheet of the bag are held by the chains 26. The pins 80, 82 are actuated by cylinders 84, 86 to push the pins 80, 82 towards the front plate 72. As the pins 80, 82 extend, they clamp bag 38 against front plate 72. As the pins 80, 82 continue to extend, cylinder 76 is actuated to retract front plate 72. Simultaneously, cylinder 142 is actuated to retract pin 144 (in the direction opposite arrow B illustrated in FIG. 11) so that carriages 120, 122 move toward one another. Fingers 88, 90 move towards one another and extend into the open space created between backup plate 70 and front plate 72. During the entire opening step, fingers 88, 90 remain substantially halfway between backup plate 70 and front plate 72. Because the top portion 48 of the back sheet is fixedly held by the in-feed chains 26, as the pins 80, 82 extend they pierce the bottom sheet of the bag forming throughholes 150, 152 in the back sheet as illustrated in FIG. 12. After piercing through the bottom sheet, pins 80, 82 hold the top sheet against front plate 72 as illustrated in FIG. 1. As the pins 80, 82 continue to extend perforations 154, 156, formed in the back sheet, are broken. The broken perforations 154', 156' are illustrated in FIG. 1. The distance that the front plate 72 retracts is limited by adjustable stop 78. The position of the pins 80, 82 is also adjustable according to the preferred bag opening size and are preferably disposed along a vertical line adjacent to and below the inner most end of each perforation 154, 156 as illustrated by the position of throughholes 150, 152 in FIG. 12. Once the top plate 72 has fully retracted and pins 80, 82 are fully extended, the top of bag 38 is now open and ready to be filled. The bag 38 can be top filled either manually or automatically. The top of the bag, as is clearly illustrated in FIG. 1, is now in an open position and forms a neat square or rectangular shaped opening whose size and location is predetermined by the bag, open, fill and seal station 20. The shape of the open top of the bag is not affected by any ambient gusts of air. Thus, the position of the filling device needs to be set once, during the initial set up, and will thereafter reliably dispense contents into the open bag.

After bag 38 has been filled, cylinder 76 is actuated to extend pin 74 to push front plate 72 against backup plate 70. Substantially simultaneously cylinder 142 is actuated to extend pin 144 in the direction indicated by arrow B in FIG. 11, to cause gripper fingers 88, 90 to return to their original position. Additionally, cylinders 84, 86 are deactivated to permit the pins 80, 82 to be pushed back to their original position by front plate 72. The top of bag 38 is now clamped between plates 70, 72 and is ready to be sealed in the manner similar to how the side edges 42, 44 were sealed.

As illustrated in FIG. 13, the gripping fingers 88, 90 are returned to their original position, thereby closing the top of the bag taut for the sealing operation. The bag 38 is then ready to be sealed by a heat cut and seal blade 155. Heat, cut and seal blade 155 is actuated by pneumatic cylinder 157 so that the heat, cut and seal blade 155 extends forward towards the front plate 72 and through the slot 159 in front plate 72. The bag is then sealed and cut along seal line 158 as illustrated in FIG. 13. The bag will then drop into a box or onto a conveyor for further processing.

Referring now to FIG. 13, it should be noted that the grippers 88, 90 close the top of the fried bag just below seal line 158. Thus, the fingers permit the top of the bag to be clamped flat between the back plate 70 and the front plate 72 which is disposed slightly above fingers 88, 90. Thus, fingers 88, 90 eliminate substantially all wrinkles and creases that otherwise would be caused by the product in the bag if, for example, the seal line at the top of the bag were to be made below the position of gripper fingers 88, 90 as is indicated by hypothetical seal line 160. Because the contents of the bag would generally cause wrinkles in the shape of the bag below the gripping fingers 88, 90, any seal which is made below gripping fingers 88, 90 is likely to contain wrinkles or creases. The remaining trim piece 48 (i.e., the portion of the bag disposed above seal line 158) is then fed by in-feed chains 28 to a disposal area and the next bag is indexed into the bag open, fill and seal station 20. Of course, the trim piece 48 can be recycled for further use.

Having described the presently preferred exemplary embodiment of an apparatus and method for forming, filling and sealing a bag in accordance with the present invention, it is believed that other modifications, variations and changes will be suggested to those skilled in the art in view of the teachings set forth herein. It is, therefore, to be understood that all such modifications, variations, and changes are believed to fall within the scope of the present invention as defined by the appended claims.

What is claimed is:

1. An apparatus for filling and sealing a bag having a top sheet and a bottom sheet, the bag having a leading edge seal, a trailing edge seal, a bottom edge seal and an open top edge with an upper portion extending therefrom, said apparatus comprising:

a back plate;

a slotted front plate disposed adjacent to said back plate, said slotted front plate and said back plate clamping a portion of said bag disposed below said top edge, said front and back plate extending from said trailing edge to said leading edge;

a pair of pins each having a distal end that moves from a first limit second limit position, in said first limit position said distal end of said pins are spaced from said bottom sheet, in said second limit position said distal end of said pins penetrate through said bottom sheet and clamp said top sheet against said front plate; and

a first cut and seal blade disposed adjacent to said slotted front plate for sealing said open top edge of said bag.

2. The apparatus according to claim 1, wherein in said second limit position said slotted front plate is spaced from said back plate.

3. The apparatus according to claim 2, further comprising a pair of gripping fingers, one of said pair of gripping fingers clamping said leading edge adjacent to and below said front plate and said back plate and the other of said pair of gripping fingers clamping said trailing edge adjacent to and below said front plate and said back plate.

4. The apparatus according to claim 3, wherein in said second limit position said pair of gripping fingers are disposed substantially half way between said back plate and said slotted front plate.

5. The apparatus according to claim 4, wherein, said first cut and seal blade moves from a first limit position to a second limit position, in said first limit position, said first cut and seal blade is spaced from said slotted front plate, in said second limit position, said first cut and seal blade is disposed in said slotted front plate.

6. The apparatus according to claim 1, further comprising a bag perforator including a plurality of cutting members.

7. The apparatus according to claim 6, wherein said plurality of cutting members moving from a first limit position to a second limit position, in said first limit position said plurality of cutting members are spaced from said bottom sheet, in said second limit position said plurality of cutting members penetrate through said bottom sheet in two spaced apart locations.

8. The apparatus according to claim 7, wherein said two spaced apart locations are colinear, each of said perforations in said spaced apart locations have a length that are approximately equal to one-fourth the width of the bag.

9. The apparatus according to claim 8, further comprising a bag forming station including a second cut and seal blade member, said second cut and seal blade member moves from a first limit position to a second limit position, in said first limit position, said cut and seal blade member is spaced from said top and said bottom sheet, in said second limit position, said second cut and seal blade member contacts said top sheet and said bottom sheet to simultaneously form a trailing edge seal of an upstream bag and leading edge seal of a downstream bag.

10. The apparatus according to claim 9, further comprising a cutter member disposed adjacent to said bag forming station, said cutter member including means for cutting only said top sheet of said bag to form a slit that is disposed substantially parallel to said two colinear spaced apart locations formed by said bag perforator.

11. An apparatus for filling and sealing a bag having a top sheet and a bottom sheet, the bag having a leading edge seal, a trailing edge seal, a bottom edge seal and an open top edge with an upper portion extending therefrom, said apparatus comprising:

a bag perforator including a plurality of cutting members, said plurality of cutting members moving from a first limit position to a second limit position, in said first limit position said plurality of cutting members are spaced from said bottom sheet, in said second limit position, said bottom sheet is in a bottom position and said plurality of cutting members penetrate only through said bottom sheet in two spaced apart locations;

means for opening said bag to permit filling of said bag; and

means for sealing said open top edge of said bag.

12. The apparatus according to claim 11, wherein said two spaced apart locations are colinear, each of said perforations in said spaced apart locations have a length that are approximately equal to one-fourth the width of the bag.

13. The apparatus according to claim 12, further comprising a back plate, a slotted front plate disposed adjacent to said back plate, said slotted front plate and said back plate clamping a portion of said bag disposed below said top edge, said front and back plate extending from said trailing edge to said leading edge, a pair of pins each having a distal end that moves from a first limit position to a second limit position, in said first limit position said distal end of said pins are spaced from said bottom sheet, in said second limit position said distal end of said pins penetrate through said bottom sheet and clamp said top sheet against said front plate.

14. The apparatus according to claim 13, wherein in said second limit position said slotted front plate is spaced from said back plate.

15. The apparatus according to claim 14, further comprising a pair of gripping fingers, one of said pair of gripping

fingers clamping said leading edge adjacent to and below said front plate and said back plate and the other of said pair of gripping fingers clamping said trailing edge adjacent to and below said front plate and said back plate.

16. The apparatus according to claim 15, wherein in said second limit position said pair of gripping fingers are disposed substantially half way between said back plate and said slotted front plate.

17. The apparatus according to claim 16, further comprising a first cut and seal blade disposed adjacent to said slotted front plate, said first cut and seal blade moves from a first limit position to a second limit position, in said first limit position, said first cut and seal blade is spaced from said slotted front plate, in said second limit position, said first cut and seal blade is disposed in said slotted front plate.

18. The apparatus according to claim 17, further comprising a bag forming station including a second cut and seal blade member, said second cut and seal blade member moves from a first limit position to a second limit position, in said first limit position, said cut and seal blade member is spaced from said top and said bottom sheet, in said second limit position, said second cut and seal blade member contacts said top sheet and said bottom sheet to simultaneously form a trailing edge seal of an upstream bag and leading edge seal of a downstream bag.

19. The apparatus according to claim 18, further comprising a cutter member disposed adjacent to said bag forming station, said cutter member including means for cutting only said top sheet of said bag to form a slit that is disposed substantially parallel to said two colinear spaced apart locations formed by said bag perforator.

20. A method for filling and sealing a bag having a top sheet and a bottom sheet, the bag having a leading edge seal, a trailing edge seal, a bottom edge seal and an open top edge with an upper portion extending therefrom, said method comprising the steps of:

positioning the bag between a back plate and a slotted front plate;

clamping a portion of the bag disposed below the top edge with said front plate and said back plate;

opening the bag by moving a pair of pins from a first limit position where the pins are spaced from the bottom sheet of the bag to a second limit position where the pins penetrate through the bottom sheet and clamp the top sheet against the front plate thereby forming an opening in the top of the bag; and

sealing the open top edge of the bag.

21. The method according to claim 20, further comprising the step of clamping the leading edge and the trailing edge of the bag at a position adjacent to and below the front and the back plate with a pair of gripping fingers.

22. The method according to claim 21, further comprising the step of cutting the top edge of the preformed bag.

23. The method according to claim 22, further comprising the step of perforating the bottom sheet of the preformed bag in two spaced apart locations.

24. The method according to claim 23, wherein the two spaced apart locations are colinear, each of the perforations in the spaced apart locations have a length of approximately one-fourth the width of the bag.

25. The method according to claim 24, further comprising the step of cutting a slit in only the top sheet such that the slit is disposed substantially parallel to the perforations in the two spaced apart locations.

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